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AIRBORNE SURVEYING IN THE ANTARCTIC

THE FALKLAND ISLANDS AND DEPENDENCIES AERIAL SURVEY EXPEDITION 1955–57

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IT HAS BEEN said that the British have in recent years been so obsessed with the story of Shackleton and Scott that they cling unduly to outmoded methods in their Polar expeditions. That such criticism is quite unfounded is borne out by the work of the recent expedition which has been engaged during the past two Antarctic summers in an aerial survey of the Falkand Islands Dependencies.

The expedition, known by the rather long-winded title of "The Falkland Islands and Dependencies Aerial Survey" (FIDASE for short), was sponsored by the Colonial Office and financed from United Kingdom Government funds. Both in the range of its activities and the numbers of personnel it can claim to be one of the largest and technically best equipped British expeditions that have visited the Polar regions for the last half-century. It is also, so far as I am aware, the only expedition of its kind which has been carried out entirely under contract to a civil operating company, a sign perhaps of the trend of modern exploration away from what may be termed the "heroic" era to one less romantic but more concerned with systematic study and development.

Early in 1955 the organization of the expedition and the execution of the combined programme of air and ground work was put out to tender by the Crown Agents for Oversea Governments and Administrations, and the contract was subsequently awarded to Hunting Aerosurveys Ltd. There were three main requirements in the programme laid down, namely:

(1) Vertical air photography of an area approximately 42,000 square miles to include the South Shetland group of islands, the Palmer Archipelago and that part of the Graham Land Peninsula lying between lat. 62° and 68° S., with the exception of a small margin along the east coast where it merges with the pack ice of the Weddell Sea.

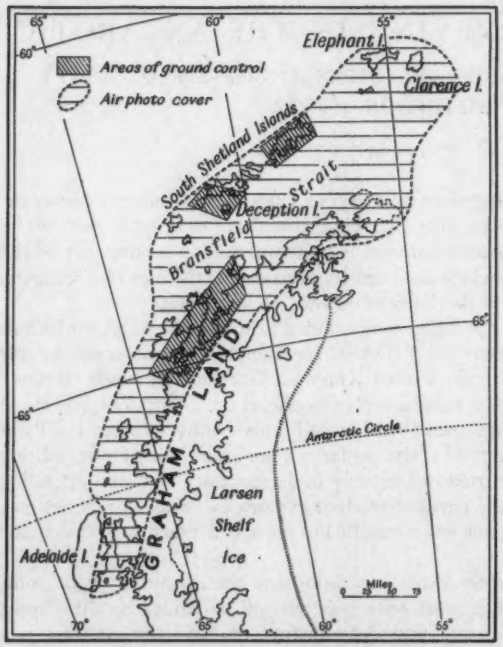
(2) The provision of a framework of ground control to be carried out by conventional methods of triangulation if possible, or alternatively by independent astronomical fixes, sufficient in density to enable the air photography to be used for the preparation of accurate maps of the area.

(3) In certain specified areas to provide airborne magnetic profiles for geological investigation.

The plan was to establish a base for two long-range amphibian aircraft at

Deception Island in the South Shetlands. The island is shaped like an atoll with a rim of ice-capped mountains containing an inner harbour, Port Foster, which is 4 to 5 miles across. During the open season, December to March, Port Foster is usually free of ice and forms the safest natural anchorage in the whole of Antarctica.

Two Cansos (the amphibian version of the Catalina) were modified in Canada for both vertical and oblique photography. One of the aircraft was also fitted with airborne magnetometer equipment for recording the total intensity of the earth's magnetic field. The Canso was selected because of its very long range, because we could beach the aircraft out of danger of ice floes that might drift into the bay, and for easier servicing and refuelling. The possibility of using a landplane was ruled out on the ground that there was no strip long enough to accommodate an aircraft with the required duration and capacity for the job.



For the transport of the expedition personnel and equipment, and to serve as a mobile base for a helicopter, we chartered a Danish freighter, the *Oluf Sven*, of 950 tons. Some of the extensive modifications carried out to the ship before her departure included partitioning off an area in the aft hold to provide messing and accommodation for eighteen expedition members travelling out on the ship, and the fitting of a removable flight-deck for helicopter landings, so designed that it could be carried out as part of the cargo and reassembled over the top of both holds after discharge of all stores on arrival at Deception. In addition to her roles as passenger ship, freighter and helicopter carrier, the *Oluf Sven* had also to serve as a tanker for the carriage of 60,000 gallons of aviation fuel, for which a special gas-tight bulkhead was built to separate the forward hold from the rest of the ship. Altogether she carried in her capacious holds a total of 600 tons of stores and equipment. It is to be wondered whether any ship of so small a tonnage has ever before been expected to meet so many and such varied demands.

The successful use of helicopters for surveying the northern parts of Canada and Alaska had suggested the idea of employing similar methods in Graham Land. Here, indeed, was the one way to overcome the formidable obstacles of ice and terrain with which the surveyor has to contend in Polar regions. As part of our accepted plan, therefore, we undertook to carry with us two S.51 Sikorsky helicopters, one

being held in reserve in case of mishap to the first. The helicopters and crew were supplied under sub-contract by Autair Ltd.

Firm instructions to proceed with the organization of the expedition were not received until 26 May 1955, which left a bare five months in which to carry out the whole of our planning and preparations. Had it not been for the very large measure of assistance which we received from Government and Service departments and the wealth of expert advice that we were able to draw on from outside and from within our own organization, it is certain that the many technical and administrative problems involved could not have been overcome in so short a time. It was also a tremendous help to be able to off-load all preparatory work connected with radio communications and navigational aids to International Aeradio Ltd., while Autair Ltd. were responsible for everything to do with the helicopters, and our associates in Canada, Kenting Aviation Ltd., carried out all work on the Cansos.

Although we tried to obtain the fullest information possible on local conditions that we were likely to meet in the area, and were greatly helped by many who had already been there, the available data was by no means complete and uncertainty existed on such important matters as the gradient and structure of the beach at Whalers' Bay, the tide-range, and the properties of the area for radio communication; all of which could influence greatly the type of equipment to be used. To overcome this lack of information we selected equipment that was as adaptable as possible, our choice being governed to a large extent by what was available for release on loan from Service departments. Looking back, I cannot remember any item of this equipment which we did not use or which failed to give us reliable service.

One of the difficulties in selecting personnel for an expedition of this nature is to find men holding the necessary technical qualifications who are at the same time physically strong enough and mentally suited to the type of life. Fortunately we were assisted in this particular problem by the fact that the majority of the personnel came from within our own organization and were therefore already well known to one another. Since there are so many names involved I have thought it best to include them in a separate list at the end of the paper, which also shows the changes of personnel in the second year.

Season 1955–56: Air photography.—The *Oluf Sven* first sailed from London Docks on 21 October 1955 and completed the 8000-mile voyage to Deception Island in forty-three days. Whalers' Bay, where we dropped anchor in the early hours of December 4, lies just inside the entrance to Deception Island, known as Neptune's Bellows. From the low promontory of Penfold Point the bay sweeps in a semicircular arc for half a mile across to the line of jagged cliffs leading to the "Bellows." Behind the centre of the bay the ice-covered slopes that form part of the main mountain ridge of the island give way to a broad, gently sloping beach of volcanic ash. Dominating the north end of this beach are the remains of the old whaling station, a shambles of twisted steel and tumbled buildings, with a number of large oil storage tanks that are still in quite good repair. A large hut (originally part of the whaling station) lies on high ground at the back of the factory and is now permanently occupied by members of the Falkland Islands Dependencies Survey, who extended us their hospitality and assistance throughout our stay. When we arrived the snow was down almost to the tide-mark and drifts 10–20 feet deep overlay much of the debris of the whaling station and filled the deep channels that later contained melt streams from which we drew our water supply.

During the next six weeks we forgot our specialist jobs and set about the major

tasks of unloading the ship and setting up the base installations in readiness for the arrival of the Cansos. The difficulties of unloading were accentuated by the very large size of many of the crates and the restricted access to No. 2 hold caused by the new accommodation. Practically all the stores were brought ashore by means of a military shore-loading raft on loan from the War Office. This consists of two folding boats joined together by steel transoms which support light girders carrying a track. At either end are articulated ramps which can be accommodated to any slope of beach and act as counterbalances when the load is unequally distributed. Individual loads up to 6 tons were transported by this equipment, with which the entire unloading operations were carried out without loss or damage: it was also used later on to lay the aircraft moorings. During this period a total of 500 tons of aviation fuel and stores, varying from aero-engines and hut parts to sacks of coal, was ferried ashore, the largest item of all being the 4½-ton tractor.

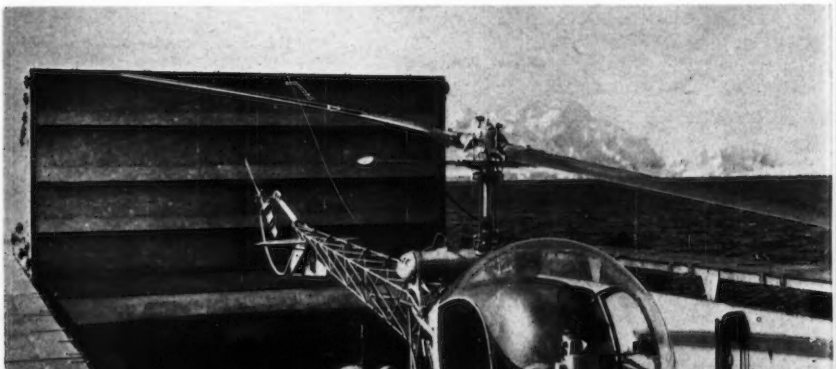
While the unloading continued, the rest of the party were engaged on the construction of the hut and in setting up the radio station. For the foundations of the hut we were fortunate in finding a ready-made concrete plinth originally intended for an oil tank that had never been built. One day's work with the bull-dozer cleared the site of ice and we then hauled into position some two hundred pre-cast concrete blocks, brought out from England, which carried the floor joists. The hut measured 60 feet long by 20 feet wide and was divided into four rooms, one to house the generators, a combined canteen and kitchen, a darkroom, and a drying-cum-workroom for processing and printing the aerial film. One rather unusual feature in the hut was the use of a series of aircraft fuel tanks to store 500 gallons of water in the roof, where it could be pumped to maximum head and kept from freezing by the warmth of the rooms below.

Deception Island has a reputation (well-earned!) for orographic cloud which hangs round the mountain rim and, when the temperature drops, sinks into the central "crater" of the island, descending at times to sea level. Since the southern limit of the area to be photographed was 400 miles distant from our base and there was no alternative haven, it could happen that an aircraft having taken off in good weather, might return from a long sortie to find the whole landing area smothered in cloud. To offset this danger we had to provide two forms of approach aid: the first a radio MF beacon of 600/800 watts output, and the second a radar device known as Rebecca-Eureka which gives the pilot both bearing and distance during approach. For long-range communications between the base, the aircraft, and the ship we installed an HF transmitter of 300 watts output, usable by RT or CW. Finally, to provide local communication between ship, motor-launch, aircraft, field parties, helicopter and control base, a 50-watt VHF system was installed at the base with a 15-watt set on the ship, all units employing a common frequency. The field parties were equipped with both HF and VHF lightweight walkie-talkie sets, manufactured by the British Communications Company.

On 7 January 1956 we were at last able to signal the two Cansos waiting at Port Stanley in the Falkland Islands that we were ready to receive them. The weather had been particularly good during most of December and we were therefore anxious to commence the photography at the earliest possible opportunity. Three days later the Cansos successfully completed the final leg of their 9000-mile flight from Canada. It was a perfect evening, with only a few patches of high stratus breaking an otherwise cloudless sky. The planes made a fine sight as they flew abreast over the ice-capped circle of mountains, their fuselage silver with wings and floats

Canso aircraft on photographic sortie; Graham Land in background

Expedition members (1st Season, 1955–6): leader P. G. Mott in white jersey



Bell 47D helicopter being raised on lift; McGregor folding steel hatch in open position

Wreckage of Bell helicopter on Tower Island

painted bright scarlet for purposes of easy identification in case of a forced landing on snow.

Unfortunately we had not fully realized that by the middle of January the Antarctic summer is nearly over. Almost to a day with the arrival of the aircraft the weather took a sudden dive for the worse. For the next three weeks there was scarcely ever a break in the cloud cap over the island, and long periods of snow and high winds. The only good thing about this enforced period of delay was that it gave us an opportunity to complete the construction of several base installations, the most important of which was the slipway.

The shore at Whalers' Bay is composed entirely of volcanic ash which, either dry or wet, is too soft for beaching an aircraft of the weight of a Canso. To overcome this difficulty we took out with us 10 tons weight of perforated steel plate, similar to that used for making temporary air strips during the war. The plates, which are in 10-foot and 5-foot lengths, interlock and are fastened together by steel clips. Using this material, we laid a slipway 220 feet long and between 28 and 44 feet wide, extending well below the level of low water at spring tide. This enabled both Cansos to be accommodated on shore, one behind the other, but still gave no room to manoeuvre or turn. Having run out of steel plates, we salvaged five thousand bricks from the whaling factory and laid these over sheets of corrugated iron bedded in with ash from the beach, which made an excellent hard standing, although the labour involved was rather more than we bargained for. In the second year we took out a further quantity of steel track and extended the slipway to form a complete taxi-ing circuit.

The first fully operational flight took place on February 5. Even on this day the area of clear weather was not large enough to warrant both aircraft operating. As became normal practice whenever conditions were doubtful, one Canso took off first and after gaining height gave a visual report which decided whether the second plane took to the air; in this way we cut down the amount of abortive flying and conserved our precious supply of aviation fuel.

On this first productive flight satisfactory cover was obtained over several islands of the South Shetland group, but the sortie had to be cut short due to heating failure in the camera compartment, in which the temperature dropped to −22° C. On the following day both aircraft were again airborne, and photographed Trinity Island and part of the Palmer Coast. Two further flights were made, one on February 11 and the other on March 6, but by this time the days were getting rapidly shorter, and with the progressive deterioration in weather, it soon became clear that any flying, whether for photographic or geophysical purposes, if carried out after the middle of January, was very much a matter of "scraping the bottom of the barrel." We managed to complete one additional flight with the magnetometer on February 29, when a satisfactory heading test was made, but this was the only occasion when conditions were suitable for using this equipment.

On March 13 we experienced the worst of the sudden and violent gales which had become an unwelcome feature of our life at Deception. The wind during the night reached 80 m.p.h. and the two aircraft, which were picketed on shore, received severe damage to their ailerons. It took the engineers ten days to fabricate and fit new parts, after which the Cansos promptly left on the return flight to the Falklands and Montevideo.

Although the results of this first flying season were disappointing for all concerned, they were not unexpected, for it is too much to hope that one can set up all the many installations required to service two large flying boats in an area

where no facilities exist, and also to operate successfully in the one short Antarctic season. We had, however, made a start on the photographic programme and in doing so had gained experience that was to be of untold value in the following year when we were able to take advantage of the good weather period at the start of the season.

The amount of exposed rock in the Antarctic is much less than in the Arctic, due to the warming influence of the Gulf Stream on the latter, and the more complete isolation of the former. At first sight the immense overburden of snow and ice in the Antarctic would appear to simplify the photographer's problem, for he has in general only one type of surface to contend with. In fact, however, this is far from being the case. Over the high plateau, the glaciers, the shelf ice and the ice-domed islands, the unrelieved sameness of texture and tone require the most exacting assessment of exposure and particularly development, without which variations in relief become indistinguishable. Conversely, in the areas of high relief there is an excessive amount of contrast between the brilliance of the reflected light in the areas exposed to sunlight and the extent of deep shadow caused by the low inclination of the sun in high latitudes. The photographer's most difficult problem of all, however, lies along the coast where there are literally thousands of rocky islets and reefs which, in summer, are free of snow and require entirely different treatment to the dazzling brilliance of the coast with its continuous fringe of ice cliffs and glaciers. There is no complete answer to this problem, but a successful compromise was arrived at by using low contrast development.[1]

All "vertical" photography (that is, with the axis of the camera directed vertically downwards) was undertaken with the Williamson Eagle IX camera fitted with a lens of 6 inch focal length and having a negative size 9 inches square. The magazine of the camera provides for two hundred negatives on a roll of film. Photography was carried out in the conventional manner with normal forward overlap of 60 per cent. and 30 per cent. lateral overlap between strips, so as to provide complete stereoscopic coverage of the area. In addition, the specification called for a continuous series of fixed obliques which were provided by a Williamson F.24 camera of $3\frac{1}{4}$ inch focal length and format 5 inches square. Fixed mountings and ports on both sides were supplied for the oblique camera, the axis of which was directed at a fixed angle of 30° to the horizontal and at right angles to the line of flight. The purpose of these obliques was to assist in the interpretation and identification of features, to help in the study of F.I.D.S. sledging routes to the plateau from the coast, and with the possibility that in some areas they might be used to carry out reconnaissance mapping beyond the area of vertical cover.

The camera compartment was located immediately aft of the step in the hull, where it was normally free of contact with the water. The mounting of the vertical camera was fixed to a sliding carriage which could be moved forward, leaving the opening in the hull to be filled by a port hinged at one side and capable of being lowered and bolted down to provide a watertight hatch. The design and manufacture of this installation was carried out by Kenting Aviation in Canada, and proved highly satisfactory.

The fact that the ceiling of the aircraft was limited to 13,500 feet over terrain which often rose with appalling abruptness from sea level to 7000 (or over 9000 feet in one case) made the timing of the interval between exposures one of extreme difficulty. Between runs it was often necessary to increase the lateral overlap to

[1] On return to England the difficulty has been largely overcome by employing an electronic printer which provides automatic masking over the whole area of the negative.

60 per cent. near the coast and even then it was possible to get a gap only a few frames later. Since there were no reliable maps of the area, several methods had to be tried out for the navigation of the flight-lines. The navigator's greatest problem was when flying over the high central plateau of Graham Land, which for the most part is a featureless area of snow with only here and there a rocky outcrop or a line of crevasses to serve as a reference point, while in some of the coastal areas he was apt to be confused by the similarity of one feature with another. Luckily we had selected some very skilled men for the job, and with few exceptions the accuracy of the flying set a high standard for such exceptionally difficult country.

Ground control.—During December 1955 and the first half of January 1956, the whole of our efforts had been spent in preparing for the Cansos, and it was not until after their arrival that we could begin to concentrate on the second part of our programme, that concerned with the provision of the ground control which was needed to give the geographical positions and heights of points when subsequently carrying out mapping from the air photographs.

The period when the flight-deck was being constructed on the *Oluf Sven*, and the helicopter assembled and trial-flown, was usefully occupied by the five survey members of our team in measuring a base-line and observing its extension in the immediate area of Deception Island. The shape of Deception, with its circle of hills surrounding a 5-mile stretch of water, was ideally suited to the layout of the scheme, and it was possible to carry this out in text-book style with almost perfectly conditioned figures, finishing up with an extended base 8 miles in length joining the two highest snow peaks of the island, Mount Pond and Mount Kirkwood. The slopes of the two mountains were heavily glaciated and gave us our first chance of some mild mountaineering during this stage of the work.

At last, on February 6, we made our first operational sortie with the helicopter, when Bancroft and I were dropped on the summit of Mount Pond. It was at first a rather startling experience to be suddenly transported from the comparative warmth and shelter of the ship to within a few yards of our beacon on the crest of the mountain, where an icy wind of 25 knots was swirling clouds of snow in its path. The climb, which had previously taken us two hours slogging on foot, was completed in the same number of minutes by helicopter, a striking demonstration of the potentialities of this form of transport. Not only is it possible by this means for the surveyor to seize every opportunity offered by short breaks in the weather, but it enables him to arrive at his destination unfatigued and to avoid the chilling effect resulting from getting overheated on a long climb.

One advantage of the S.51 (which we missed the second season when using the Bell 47) was the ability to jump down when hovering a few feet above ground. For the first few "drops" the helicopter never alighted at all and we soon effected a technique for clambering in and out at different hovering heights up to 5 feet above ground. This can be very useful when the condition of the snow surface is unknown or in places where there is a risk of the helicopter making a landing, and in the absence of a winch gear. For convenience of loading and unloading equipment, however, it is desirable that the aircraft should land whenever possible, and with increased experience, plus the addition of skids fitted below each wheel, snow landings soon became the rule rather than the exception.

Despite a good deal of wind and cloud, considerable progress was made with the survey during February. The triangulation was carried across to points on Livingston Island and Snow Island and an attempt made to carry through the major connection from the South Shetlands across the Bransfield Strait to the mainland. For

the latter purpose a party of three surveyors was landed by helicopter on Astrolabe Island, which had only once before been visited, by Nordenskiold in 1901. The two highest points of the island proved inaccessible but the party succeeded in reaching the third high peak, which is suitable as a survey station. Unfortunately the weather by this time had deteriorated so badly that they were unable to make any progress with the survey, although they remained on the island for fourteen days.

During these survey operations we had many opportunities of studying the flora and fauna of the places we visited. On the east shore of False Bay, at the southern extremity of Livingston Island, there is a long beach of rounded granite boulders behind which a series of terraces descend from precipitous scree slopes. All along this foreshore we were astonished to find large patches of fine grass and a variety of different mosses, so green in parts that it might have been a hillside in Cumberland had it not been for the neighbouring ice cliffs and massive snow peaks beyond. Besides several rookeries of Ringed Penguins, these grassy terraces were well populated with the nests of Skuas and Giant Petrels. The petrel chicks are about the size of a pullet and are covered in the finest down-like powder puffs of blue-white and grey; they have, however, an unpleasant habit of defending themselves by vomiting a well-directed stream of fishy fluid and it is advisable to keep out of range. The shore below our camp was littered with Elephant Seals. It was the mating season, when the bull seal, which may weigh up to 3 tons, is usually surrounded by several cows; like most seals when on shore they spend the greater part of their time asleep, but when roused from their lethargy they heave up their massive bulk, roll their bloodshot eyes and let off an angry bellow before dropping off to sleep again. Bancroft found another large Elephant Seal wallow on Snow Island. On Astrolabe Island several Fur Seals were found, now comparatively rare since they were nearly exterminated by the sealers in the nineteenth century. A single Fur Seal also turned up one day at Deception Island.

The need to establish an alternative base for the aircraft much further south than Deception Island was foreseen long before the expedition set out. Moreover, it is well known that the weather in the southern part of Graham Land is considerably better than in the north. With this in mind it was decided, before we returned to England, to carry out a reconnaissance with the ship, with the object of investigating the known harbours of Port Lockroy, the Argentine Islands, Mutton Cove and further south still, if time and ice conditions permitted. On March 17 the *Oluf Sven* sailed from Deception and during the following ten days we followed down the west coast of Graham Land, passing through the Neumayer Channel to Port Lockroy and thence by way of the Lemaire Channel to the Argentine Islands. Whatever hopes some of us had entertained regarding the suitability of these bases for flying boats were quickly dispelled as a result of this cruise. At the Argentine Islands, where in 1936 the British Graham Land Expedition had successfully operated a small float plane, we found on arrival that the several creeks giving access to the inner harbour were filled with loose pack and grounded icebergs, and it was only with some difficulty that the ship reached an anchorage. After spending three uncomfortable nights playing hide-and-seek with a particularly menacing iceberg, which nearly carried away one of our lifeboats, we decided that the Argentine Islands were not perhaps such a good place for flying boats after all. As we progressed further south, we met an increasing number of bergs, varying from large tabular islands several miles in length to creations of fantasy that reminded one of some of the works of Picasso. Proceeding by way of Grandidier Channel and Pendleton Strait, we entered Darbel Bay from the west through Matha Strait and

reached our furthest south on March 24 at lat. 66° 40′. So far we had been dogged all the way by low cloud, but by this time conditions were sufficiently improved to enable us to carry out two helicopter flights during which a visual and photographic reconnaissance was made in the little-known areas of Lallemand Fjord and Hanussa Bay. We were finally convinced by this reconnaissance, and what we had already seen, that the chances of finding a harbour large enough and sufficiently protected from ice to act as an advance base for the aircraft were virtually negligible. Nor did we find anything to alter this view in the second season, when the whole of this coastline was photographed.

The *Oluf Sven* returned to Deception Island on March 27, and after closing down the base for the winter sailed for England on April 7. The small amount of flying in this first season was disappointing, but not unexpected. Nevertheless, we could claim a fair measure of success. All the hundreds of items needed to mount a highly complex operation had been landed without loss and subsequently had functioned well, and there had been no major breakdowns of ship, aircraft or equipment. Moreover, we had gained valuable experience in three different types of survey operations never before tried out in the Antarctic—the use of long-range amphibian aircraft for vertical photography; the employment of a ship-based helicopter to transport surveyors; and the recording of geophysical information by airborne magnetometer. We returned with the knowledge that the job could be done and felt confident that we had gained the experience of how to do it. Now that we possessed an established base, the problems of the second season appeared light compared with the many unknowns which had confronted us at the start.

Season 1956–57: Air photography.—Preparations for the second season continued throughout the summer (northern) of 1956. With the exception of the geophysical work, which had to be cut out on account of cost, the programme remained virtually unchanged. We were asked, however, to make a special effort to obtain photography of the Falkland Islands on the way out, which we had been unable to do the previous year owing to limited time and bad weather while the Cansos were at Port Stanley. With this in view the two Cansos left Canada two months ahead of their departure date the previous year, and reached Port Stanley on 15 October 1956. We had been warned that October was the best season for weather in the Falklands, and so it proved. During the next five weeks the two aircraft between them completed over a hundred hours' flying, and were successful in obtaining vertical cover at a scale of 1 : 25,000 of the whole of the islands, an area of approximately 4500 square miles, involving over 5000 negatives. This was indeed an encouraging start to the season's work and augured well for the more formidable task that lay ahead in the Dependencies further south.

Meanwhile, before departure, the *Oluf Sven* was undergoing some further modifications to her flight deck in the light of the experience gained the previous year. This time we had no aviation fuel to transport, which meant that the forward hold of the ship would be available and could be used as a hangar for the helicopter. During the first season's operations we had been forced to retain the helicopter on deck where it was at times in danger of being swept overboard by the gales and became severely iced up after every blizzard. Under the new arrangement part of the old flight-deck was replaced by a sliding steel hatch which, when open, gave access to the full opening of the hold. Within the hold a lift, operated by two hand-winches, enabled the helicopter to be raised up to, and lowered down from, deck level. By this arrangement it was possible to carry out the helicopter from England fully erected, and it could be serviced in periods of bad weather when the engineers

could work in conditions of relative comfort in the heated hangar below decks. Another advantage lay with the ship which, free of the encumbrance of the helicopter on deck, would be much more manoeuvrable and able to meet bad weather when it came. This time we took a Bell 47.D type helicopter in place of the S.51, which had met with an accident. Although a smaller aircraft, the Bell had the advantages of better vision through the perspex bubble which forms the cockpit, and could be fitted with floats, giving it better safety over water and making for easier landing on soft snow.

We sailed from Harwich on 20 October 1956, and arrived at Port Stanley on November 21, where we were met by the Canso crews with the welcome news that the Falkland Islands job was done. I was able to inspect the cover laid out on the floor of the town hall (how easy it would be if all local authorities were so accommodating!). Feeling greatly cheered by this early success, we left again next day and reached Deception Island on Monday November 26.

In contrast to the long weeks of hard labour that had followed our arrival the previous year, this time it took us just four days to open up the base and make ready for the arrival of the Cansos. By December 1 all essential services were laid on, the mooring buoys in position, the slipway cleared of snow and debris, the radio station in operation, the hut in readiness, the tractor de-inhibited and the aircraft tender serviceable. In addition, we landed some 50 tons of food and equipment from the ship.

As luck would have it, while the sun was shining at Deception, the weather in the Falklands was particularly bad at this period, with very high winds which delayed the departure of the aircraft. This was especially frustrating since the delay cost us several days of excellent flying weather. It was, therefore, a great relief to all concerned when the Cansos arrived on December 9. One of our major anxieties had been the possibility of corrosion to the hulls resulting from two months of continuous immersion in salt water while at Stanley. A thorough inspection on arrival fortunately showed nothing more than superficial damage, and within two days both aircraft were fully operational for photographic work. On the first effective sortie, which took place on December 14, they flew for seven hours and completed 1200 square miles of photography—rather more than we had been able to do in the whole of the previous season!

The weather in the summer period (December–February) 1956/57 followed very closely that of the preceding year, and the number of days suitable for photographic flying showed an almost exact parallel between the two seasons, as can be seen from the following table:

Days suitable for air photography in area of F.I. Dependencies

	1955/56	1956/57
December ..	12	12
January	5	6
February	7	3
	24	21

It is significant that 85 per cent. of all effective photography this year was obtained before January 20, the day the two Cansos were first ready to operate the previous year. Not only is the weather at its best in December, but the days are long enough in this period to permit sorties of ten hours' duration with good photographic light throughout.

At last we were able to see the progress that we had waited for so long. On one particularly good day (it happened to be Boxing Day) the two aircraft were airborne by 7.30 a.m. and returned eleven hours later with nine full magazines of film, having photographed an area of nearly 3000 square miles in the one day. On January 9 one of the Cansos for the first time crossed the Antarctic Circle and reached the southern limit of the specified area at lat. 68° S., a distance of 400 miles from Deception base. Two days later both aircraft made a further flight to this area, when I accompanied one of them as passenger.

One of the most striking features about this formidable landscape, when seen from the air, is the dwarfing of size and distance. The land is a profusion of vast features, a smooth snow-covered plateau rising in places to 8000 feet above sea level; precipitous canyons with walls of black rock and floors composed of the crevassed and stippled bluish snow of moving glaciers; mountains, some with rounded summits sheathed in snow, others with sharp peaks of rock, streaked vertically with snow and crowned with sculptured white cornices; fjords piercing deeply into the edge of the plateau, in which the sheltered sea is calm as a blue mirror, reflecting perfectly the black and white cliffs; icebergs of all shapes and sizes dotting the sea and lying in the fjords, sometimes embedded in mosaic patterns of broken sea ice, sometimes floating alone far from the nearest shore.

The weather in the southern area was cloudless and as we flew down the east coast of Adelaide Island we could see quite clearly the massive peaks of Alexander Land 200 miles south, and had to resist the temptation to fly on, which we could easily have done. On this, the last occasion when we were able to reach the southern area, we completed photography of practically the whole of the Loubet Coast and the eastern half of Adelaide Island. The area was remarkably free of ice, only Hanussa and Lallemand fjords being blocked with solid pack ice; otherwise a ship could have moved with complete freedom anywhere within the area down to about lat. 69° S., where we could see the limit of the main pack clearly defined. Adelaide Island is split into two separate mountain groups on the east, with a wide glacier that appears to give easy access to the unrelieved expanse of flat ice which covers the western half of the island. We estimated the highest peak of Adelaide Island to be over 10,000 feet (later confirmed by a rough calculation from the oblique photos), whereas on the most recent 1 : 200,000 map it is shown only to be 7800 feet. On the return flight to Deception we completed a coastal strip 150 miles in length and were still photographing at 8 o'clock in the evening, such was the intensity of the light.

By the middle of January the bulk of the season's photography was done and the remaining six weeks were occupied in filling gaps and in some further work over the central and eastern parts of the Trinity Peninsula. The weather was in general very poor during this period, and even on the days when flying was possible, it was usually a matter of searching for a gap in the clouds over country that had not already been covered.

On March 1 all further photographic work ceased and three days later the aircraft left for the return flight to the Falklands and thence to Montevideo and Canada.

In the two seasons' flying we had completed photography of an area of approximately 35,000 square miles, including all the South Shetland Islands (not excepting Elephant and Clarence), and practically the entire western seaboard of Graham Land between lat. 62° and 68° S. The total number of vertical photographs taken was in the region of 12,000 and obliques 1300. Taking into account the use of the obliques for mapping beyond the limits of the vertical cover, it is probable that the entire area specified in the original plan has now been photographed, of which

80 per cent. is fully covered by stereopairs of verticals, suitable for three-dimensional mapping.

Ground control.—Having discussed the first part of our programme, we must turn back and follow the progress of the second, namely the work of the control parties with ship and helicopter. In the first season we had two helicopters with a very full complement of spares. Although we never had cause to use the reserve aircraft, it nevertheless gave us confidence in our operational security. On return from the first year's operations it was made clear that a second season would only be authorized within a set limit of expenditure. Even after removal of the geophysical programme, the available finance was still insufficient to meet the cost of both the air photography and the control survey on the same terms as the previous year. The only way out which suggested itself was to make do without a spare helicopter. We knew that it was a risk to do so, but it was either that or not doing the job at all. We were supported in this decision by the knowledge that, when not flying, the helicopter would remain below decks, which had not formerly been possible with the S.51. But, unfortunately, the gamble did not come off. On the very second day of operating, when making a landing on Tower Island, on the east of the Bransfield Strait, the helicopter was caught in a violent down-draught, crash-landed and became a total wreck. Luckily neither occupant was injured, and we were able to take them off by lifeboat the following day.

Following this disaster we spent an anxious ten days waiting confirmation from London that they would send us a replacement: it says much for the confidence of those at home that this was provided. But, despite the most strenuous efforts on the part of all concerned, the second helicopter (another Bell 47) did not reach us and become operational until January 24. Once again we had lost the whole period of good weather and were obliged to carry out our control programme during the tail-end of the season, when the days were growing rapidly shorter and the weather unsettled. In the final outcome the large measure of success which was achieved under very adverse conditions provided yet further proof of the wonderful facility of the helicopter in meeting the requirements of the surveyor in conditions that could scarcely be more exacting anywhere in the world.

While the *Oluf Sven* returned to Montevideo to collect the helicopter, our team of four surveyors—Bancroft, Cheal, Brown and Rennie, with one admirable assistant, John Noble on loan from F.I.D.S., were landed on King George Island with rations and equipment for a stay of two months. By splitting up into two parties, one working east of Admiralty Bay and one west, in the course of four weeks they were able to carry out a triangulation covering half the island, which is approximately 60 miles long and 20 miles wide. The weather in the South Shetlands is notoriously bad at any time of year, and much of the travelling had to be done by boat, on ski and by manhauling sledges in conditions of high wind, blizzard and cloud. In addition, they met a good deal of opposition from brash ice that had calved off the surrounding ice cliffs of the bay and been compacted by wind into a solid mass lying along the shore. Bancroft speaks highly of the help given by members of the F.I.D.S. base at Admiralty Bay, who from time to time accompanied our parties and gave welcome support on the frequent boat journeys. On the return of the ship, by making use of the helicopter for two days it was possible to extend the survey to points on the northern and southern extremities of the island and to include Nelson Island lying to the south. By this means the area of the survey was nearly doubled and the contrast between aerial and ground methods was never more clearly demonstrated than on this occasion.

Surveyor observing from summit of Moreno Island

Helicopter landing survey party on Astrolabe Island

Deception Island: Oluf Sven *in Whalers' Bay*

Adelaide Island and Laubeuf Fjord from mainland

On January 27 the *Oluf Sven* once again sailed from Deception Island on what may be termed her second "survey cruise." Our object was to triangulate an area extending from Cape Sterneck on the Palmer Coast south to Cape Renard in lat. 65°, following down the length of the Gerlache Strait. We estimated that this was the utmost which could be done in the time at our disposal.

The procedure adopted this year was similar to that worked out in the previous season. Using the air photographs, wherever available, the points to be occupied were selected to conform to the following requirements:

(1) 10–20 miles apart and intervisible with other points in the scheme.

(2) Not normally higher than 1500 feet above sea level, in order to be below the normal cloudbase.

(3) On or near a satisfactory helicopter landing site.

(4) Accessible from the coast in case of failure of the helicopter.

(5) Identifiable on the airphotos if possible.

The ship would proceed to the area for a visual reconnaissance first from the deck, followed by a flight with the helicopter if the weather was suitable. The next stage was to visit and beacon all forward points for the next 20 miles before commencing the actual observations.

The usual day's routine began at 6 a.m., when Captain Ryge, Jacques (the senior helicopter pilot) and myself would consult together on the bridge and decide whether conditions were suitable to operate. If so, the steel hatches would be opened by the crew, and the helicopter be raised on deck, all available hands taking a turn at the winches which was always a most unpopular job, particularly after a large breakfast. When the helicopter was warmed up, the first flight would take place soon after 8 a.m. The normal duration of flight from deck take-off to landing at the trigonometrical station was no more than three minutes, corresponding to the distance in miles that the ship was away from shore. Only one passenger could be carried at a time and it was arranged that the first man on and the last man off always took full survival kit with short-range radio in case for any reason the helicopter was unable to return. The complete operation of landing two surveyors on a point with 600 lbs. of camping and technical equipment seldom took longer than twenty minutes, and about the same time would be required for their evacuation. With a larger helicopter this time could, of course, be cut in half.

Experience taught us that it does not pay to land more than two parties at a time. On the few occasions when we broke this rule we invariably finished up with one or another party "bogged down" as a result of a sudden change in the weather, which might prevent their relief for several days. Some relaxation of this condition might apply however earlier in the season, when conditions are more settled. Nevertheless, the essential value of the helicopter is its ability to make use of short breaks in the weather when the wind drops and the cloudbase lifts. The weather is often a very local affair and by moving ship 20 miles it may be possible to carry on working.

The topography along the Palmer and Danco Coasts is so different from that shown on any of the existing maps that it is often difficult to know to what particular feature a name on the map applies. Judging from the following verse which appeared in *The Bellows* (the FIDASE newspaper) the aircrews seem to have experienced similar trouble:

"The other day, up in the air,
I saw some land that wasn't there.
It wasn't there again today,
In spite of what the charts all say."

The rocky headland from which we started the work is possibly that named "Cape Spring" and lies immediately south-east of Cape Sterneck. Just south of Cape Spring lie two prominent unnamed islands which had good summits that were climbable, and were used in the extension of the main base-line which was measured along a broad snow saddle behind Cape Spring. In the course of this work one of the party nearly fell down a hidden crevasse. Measurement of the base and the observations from the base terminals took three days. From then onwards the work made steady progress in spite of very indifferent weather. Out of a total of twenty-eight days in February, the helicopter flew on eighteen. Usually the conditions were such that we could only operate for a few hours at a time, but on one of the rare days of good visibility between 8 a.m. and 9 p.m. the helicopter flew forty sorties, during which four stations at an average distance of 12 miles apart were occupied and beaconed, and all parties back on the ship before nightfall.

By the end of February we had completed a fully observed net of control extending from intersected points on Trinity Island on the north to include the whole of Hughes Bay and two-thirds of the Gerlache Strait, a straight-line distance of approximately 80 miles. On one of the very rare clear nights which we experienced throughout the whole period, we were able to observe a star fix for longitude and latitude, and thus tie the whole scheme into geographical coordinates. On March 1 the *Oluf Sven* had to return to Deception Island to serve as a radio beacon for the Cansos on their flight to the Falklands, but we were able to be back in the Gerlache Strait on March 4 to continue with the survey for a further two weeks.

As might be expected, the weather during this last fortnight was worse than it had ever been, and the days were beginning to draw in fast. The intervals when it was possible to operate were often no more than two hours at a time, and conditions so local that it could be fine on one side of the strait while there was dense cloud on the other. Five days were lost waiting to relieve two parties ashore who were confined to their tents by heavy snowstorms, high winds and cloud, but by using every available break in the weather, however short, and largely due to one windless day of fair visibility (March 7)—on which the helicopter flew a record of fifty-one sorties, being airborne nearly five hours—the triangulation finally turned the corner from the Gerlache Strait into the Bismarck Strait and was connected to Cape Renard.

To sum up, in addition to the survey of King George Island, in six weeks we had triangulated 130 miles of the Graham Land coast and fixed a total of eighty-four control points, of which twenty-four were occupied stations. This control should be more than adequate to provide the first really accurate maps of an area covering approximately 6000 square miles. Perhaps even more important, we had demonstrated that with half a dozen surveyors and a ship-based helicopter it is possible to carry through a conventional system of triangulation in the Antarctic in conditions of very unsettled weather and in an area of highly mountainous terrain, at a rate of progress which compares favourably with similar work previously carried out in temperate climates. In all fairness, it must be said that we were particularly fortunate in striking two seasons of unusual freedom from pack ice.

As an important addition to the control survey, the expedition has brought back some 900 miles of soundings recorded on the ship's echo-sounder and plotted by the navigating officer, Mr. John Huckle, by means of bearings and radar ranges to points on the coastline which have been identified on the air photographs. The areas sounded include the whole of Hughes Bay and the southern end of the Gerlache Strait, neither of which has been previously charted. Several lines of soundings have also been taken through Orleans Channel and the Davies Gilbert

Strait and off the eastern coast of Tower Island, where the information on the existing charts is entirely unreliable. A separate report on this work has been submitted to the Admiralty and it is hoped will prove of value.

The surveyors, whenever ashore, took every opportunity to collect geological specimens, which have been carefully recorded on the basis of notes and instructions given by Dr. R. Adie of Birmingham University, to whom the collection has been sent. Of particular interest was the discovery of a considerable number of plant fossils on King George Island. In 1955 one of the surveyors, F. W. Sherrell, was also a trained geologist but unfortunately was unable to accompany us the second year, when there were larger opportunities for geological work.

The *Oluf Sven* returned to Deception Island for the last time on March 20. During the nine days which it took to close down the base and load equipment we experienced almost continuous gales with heavy snowstorms and winds up to 70 m.p.h. The barometer at one period dropped to a record "low" of 965 mb. It was therefore with some feeling of relief that we finally sailed out through the "Bellows" with all equipment and personnel safely on board.

Probably no expedition has been fortunate enough to achieve all they set out to do, and we can claim to be no exception. We made our mistakes and we learnt our lessons the hard way, which is sometimes the only way. Looking back, however, on the many things which might have gone wrong, I think we can count ourselves luckier than most. With very few exceptions all the complicated paraphernalia that we took out with us functioned well. Nobody got seriously hurt and the health of the party remained at a high level throughout. Undoubtedly the most serious blow was the loss of the helicopter, but even that was partially offset by the progress made in the end. John Saffery, who served as Deputy Leader of the expedition and was in operational charge of the Canso flying, has, I think, summed it up best in the concluding words of his report on the flying: "If we had been wiser we might have done more, but we hope and believe that we did enough to make the enterprise worth while."

In conclusion, I would like to express our deep appreciation of the generous cooperation which we received throughout the expedition from all quarters. It is unfortunately not possible to mention individually the names of the many to whom we turned for help and advice, but I feel that I must mention one or two people to whom we feel a special debt of gratitude: Group Captain Bussey of the Directorate of Overseas Surveys, through whom we referred all matters concerning the technical and financial aspects of the contract, and whose sound advice and liberal understanding of our problems made relatively simple what might otherwise have been a tangled path of negotiations; Dr. Brian Roberts, who I happen to know has worked over a period of ten years with what can only be described as dogged persistence to get this air survey done; Mr. Frank Elliott, Mr. John Green and Miss Wells of the F.I.D.S. secretariat and the Crown Agents' staff, through whom we obtained the majority of our equipment and stores. To these and to many others who went to endless trouble to assist us, may I take this opportunity of saying how deeply grateful we are.

Finally, this account would not be complete without my being able to pay a small measure of the tribute which is due to John Saffery and the rest of the team who carried out the job. I cannot believe that it would have been possible to find a more efficient or a more enthusiastic company. Whatever needed to be done, whether it concerned the management of boats, or aircraft, or radio, or surveying, or simply rolling barrels, somebody was always there, ready and willing to do it with either the

expert knowledge or the necessary brawn, or a combination of the two if needed. Certainly no leader could have been better served, and for whatever success we may have achieved, to them, my companions, must go the laurels.

Appendix: Expedition Personnel

First Season 1955/56

Leader: P. G. Mott; *Deputy leader and Flying manager:* J. H. Saffery.

Canso crews: C. B. Gavin-Robinson (captain); D. K. Banks (co-pilot); E. G. H. Green (navigator/photographer); P. E. Davis (camera operator); R. Keen (engineer); J. N. H. Greenshields (captain); L. Terry (co-pilot); H. F. Lewis (navigator/photographer); W. Freeman (camera operator); M. Mugford (engineer); M. Kane (ground engineer).

Helicopter crew (Autair Ltd.)*:* G. L. Jacques (pilot); S. A. Holdaway (pilot); T. Frost (engineer); T. Howie (engineer).

Radio staff (International Aeradio Ltd.)*:* M. R. Milburn, J. Corlett, F. Shaw.

Photographers: A. H. Arkinstall, P. M. Remmers.

Cinephotographer (Seven Seas Films Ltd.)*:* B. R. Everett.

Geophysical team: K. Burrows, G. Elms.

Surveyors: A. D. Bancroft, R. Mitchell, C. C. Brown, F. Sherrell.

Meteorologist (on secondment from F.I. Meteorological Office)*:* S. Glassey.

Doctor (on secondment from F.I.D.S.)*:* W. E. McCready.

Cook (on secondment from F.I.D.S.)*:* D. B. Exley.

Steward (on secondment from F.I.D.S.)*:* D. Lee.

Second Season 1956/57

Leader: P. G. Mott. *Deputy leader and Flying manager:* J. H. Saffery.

Canso crews: C. B. Gavin-Robinson (captain); R. W. Brumwell (co-pilot); E. G. H. Green (navigator/photographer); P. E. Davis (camera operator); R. Keen (engineer); R. N. Pettus (captain); C. Grant (co-pilot); J. D. L. Symington (navigator/photographer); W. Freeman (camera operator); P. Nielsen (engineer); M. Kane (ground engineer).

Helicopter crew (Autair Ltd.)*:* G. L. Jacques (pilot); J. Patcha (pilot and engineer); B. G. Davey (engineer)

Radio Staff (International Aeradio Ltd.)*:* M. R. Milburn, R. M. McWhirter, J. Moffat.

Photographers: A. H. Arkinstall, R. A. Wood.

Surveyors: A. D. Bancroft, C. C. Brown, J. J. Cheal, A. J. Rennie, J. Noble.

Marine engineer: J. F. Marsh.

Meteorologist (on secondment from F.I. Meteorological Office)*:* B. Powell.

Doctor (on secondment from F.I.D.S.)*:* H. G. Harding.

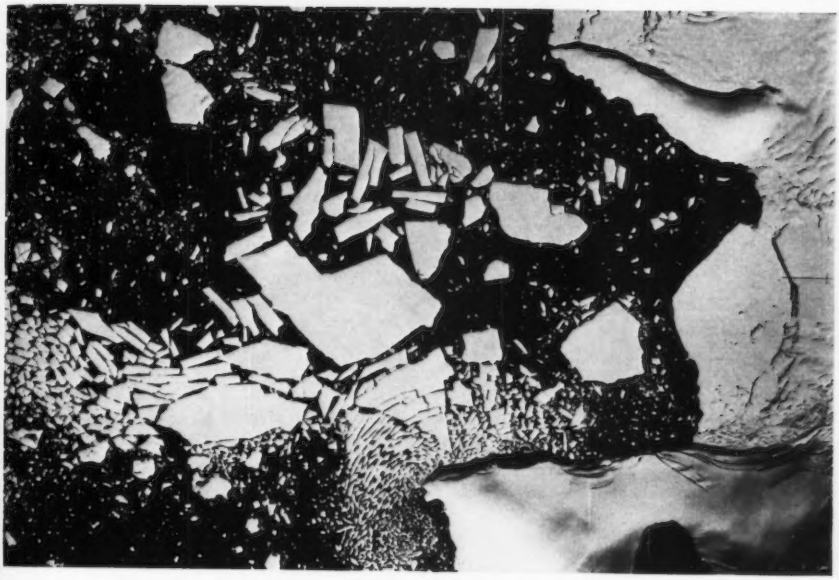
Cook (on secondment from F.I.D.S.)*:* D. B. Exley.

Steward (on secondment from F.I.D.S.)*:* G. A. Stride.

DISCUSSION

Evening Meeting, 21 October 1957

Before the paper the PRESIDENT (General Sir JAMES MARSHALL-CORNWALL) said: The subject of this evening's discussion is not only of outstanding geographical interest, but also one of considerable political importance. As you all know, the Falkland Islands form the most southerly British colonial territory, but still further south we claim sovereignty over the Falkland Islands Dependencies on the fringe of the Antarctic continent. Certain South American Republics also claim ownership of these same territories. When one wishes to develop uninhabited territory, particularly when its ownership is disputed, it is essential to have an accurate map of the region. This particular region is a difficult one to map, consisting of a scattered archipelago and the indented coastline of the Antarctic mainland. The Colonial Office therefore carried out an extensive air survey of this fringe of Antarctica during



Close pack ice near Grandidier Channel

Glacier descending from inland ice plateau, east coast of Graham Land

the Antarctic summers of 1956 and 1957. In the course of those two seasons some 35,000 square miles of territory have been surveyed from the air and accurate maps are being produced. The actual survey work was carried out for the Colonial Office under contract by Hunting Aerosurveys Ltd.

The leader of the Hunting Air Survey party was Mr. P. G. Mott, who will now tell us how the work was carried out, and will show us a film. Mr. Mott is a trained surveyor with much Himalayan and Polar experience. He was awarded our Murchison Grant in 1940.

Mr. Mott then read his paper

The PRESIDENT: After hearing Mr. Mott and seeing those wonderful pictures I think you will share my admiration for the achievement of the Colonial Office, working in cooperation with Hunting Aerosurveys Ltd.; and I would like to endorse our lecturer's tribute to his deputy, John Saffery. The Secretary of State for Colonial Affairs could unfortunately not be with us tonight owing to other duties, but we are fortunate to have with us his deputy, the Parliamentary Under-Secretary, Mr. D. J. Profumo, and I would ask him to be kind enough to say a few words to us.

Mr. D. J. PROFUMO: The Royal Geographical Society has long had a tradition of interest in Polar exploration, and it is well, Mr. President, in keeping with your tradition that Mr. Mott should have been asked to give his lecture here tonight. I know you would all wish to join me in a further word of personal congratulation and admiration to Mr. Mott for his leadership in the field of this great expedition. The photographs which were taken, in addition to those which the Americans took in, I think, 1948, will of course make it possible to make very much better maps of this territory than have ever been made before. But I know Mr. Mott will be the first to agree with me that, even with all the modern aids which we now possess, you cannot avoid altogether the foot-slogging which has to be done, and the Falkland Islands Dependencies Survey are now carrying out a great deal of the ground work which is necessary to support the aerial photographer. In the end the results of all this survey will be made available to the world at large.

The PRESIDENT: In the absence in the Antarctic of Dr. Fuchs, the Falkland Islands Dependencies Scientific Bureau is being directed by one of our Vice-Presidents, Sir Raymond Priestley, and I will ask Sir Raymond if he will speak.

Sir RAYMOND PRIESTLEY: Mr. President, My Lords, Ladies and Gentlemen, I was privileged to get out of my wheel-chair last January and to go south in the train of Prince Philip to Deception Island, and I remember when we arrived the island was blanketed in thick white mist. As we came in through Neptune's Bellows in the royal barge, I got some idea of the hazards, even in summer, of aerial survey in the Southern Ocean since we passed the wreck of a whale-catcher on our starboard side. Mr. Mott has had one or two sly digs at previous ground surveyors, and I must remind him that ground explorers of a few years ago had a very bad time because air survey had not been supported by ground control. I need not go any further than cite the experience of John Rymill and his companions in the thirties when they tried to find Stefansson Strait, which was supposed to give them a passage through Graham Land to the Weddell Sea, and which does not exist. This survey, of course, is a very different matter, even though the film we have just seen is entitled "Based on Deception." I would like to remind Mr. Mott, as I assure him of my and our appreciation of a good job splendidly done, that quite a number of ground surveyors of the Falkland Islands Dependencies Survey are now working hard in order to intensify the ground control and fill in the detail of his map. And I know that they will be delighted to be contributing to what is a really first-class job.

Oluf Sven *at the Argentine Islands*

THE INTERNATIONAL GEOPHYSICAL YEAR

D. C. MARTIN

"THE INTERNATIONAL GEOPHYSICAL YEAR 1957–58" will be written into the history books because it recounts how man made his break through to the study of space beyond the atmosphere of his own planet Earth. But first a word of history itself. Early man could not but be aware of the sun and the moon. Indeed, we know that the Egyptians among others derived their calendar from observing first the moon, then the sun. It was important in producing food that they should be able to predict the seasons, especially when the Nile was likely to overflow and bring life-giving water to the crops. Temples were built to the sun and it was recognized for what it is, the source of heat, light and life as we know it on this planet. Throughout, the sun has been and still is the predominant character in our story.

Besides the sun, the moon and stars, early man must also have been aware of other natural phenomena such as thunder and lightning and the unpredictable variability of the weather, and those who lived in northern and southern parts of the world would be aware of the northern lights and southern lights which appeared in the sky from time to time. The name for the northern lights, aurora borealis, was first used by Gassendi in 1621 and aurora australis for the southern lights seems to have been initiated by Captain James Cook when he saw them in 1773 at lat. 57° 8′ S. There are records of observations going back a long way. Aristotle in about 350 B.C. mentions the aurora and Seneca (A.D. 5–65) refers to the aurora in 'Questiones Naturales' as "the fiery recess in the sky like a cave dug out of space." Man being of a curious habit of mind wants to find an explanation for such natural phenomena.

Although some of the Greek philosophers believed that the world was a globe they did not know how it moved in relation to the sun. Copernicus, Galileo, Kepler, Newton, and others three or four hundred years ago, by the application of their genius discerned a pattern in the movement of heavenly bodies and gave us laws of their motions. The sun and not the earth was the centre of the system of which man's planet was but a part. The sun's or solar system is but a part of an immensely greater whole which is the Universe.

Let us look briefly at some of the earlier studies of the earth itself. Queen Elizabeth's physician, William Gilbert (1540–1603), in 1600 published a book called 'De Magnete' in which he showed that the earth itself was a great magnet; a fact of great importance to all seafaring men and, as we shall see later, of central significance in the I.G.Y. Later, in 1697–1700, Edmond Halley, a former Secretary and Assistant Secretary of the Royal Society, made magnetic observations from the ship named *Paramour*, and on the basis of his measurements made a map of magnetic declination over a portion of the earth's surface. The earth's magnetic field is still studied very carefully and we know that the position of the magnetic poles changes slowly. Magnetic instruments have also told us of sudden increases in magnetic values, due to forces outside the earth itself, and these are known as magnetic storms.

Halley, who is perhaps best remembered for the famous comet which bears his name, was a pioneer in examining other phenomena connected with the planet Earth. In the *Philosophical Transactions of the Royal Society* in 1716 he offered one

of the earliest explanations of the aurora and he was the first to attempt a general survey and explanation of trade winds and monsoons. He sought to find a satisfactory theory of the general circulation of the earth's atmosphere. Since the time of Halley, many individual voyages of exploration have been made and those who sought the North-west Passage brought back observations not only of a geographical character but also of the weather, the northern lights and unusual magnetic disturbances.

In 1875 an Austrian naval lieutenant called Karl Weyprecht, returning from such an Arctic exploration, put forward the view that if only polar expeditions could be *simultaneous* and make *scientific* observations using *standardized* apparatus at *different* geographical points, then the results would be more valuable and he believed that in this way many of the mysteries of nature would be solved more readily than by unconnected expeditions and research. He, in fact, proposed that geographical exploration should be linked to scientific investigation. Lieutenant Weyprecht's idea did not find much support at first but he was very determined, and after five international conferences spread over six years his idea was accepted and the First International Polar Year was planned to take place from August 1882 to September 1883, seventy-five years ago. It was an unhappy fate that prevented Weyprecht seeing his dream come true for he died before it began. Twelve Arctic stations were set up. The programme was concentrated on meteorology, geomagnetism and the northern polar aurora, and it worked out very successfully. Some fifty years later a second Polar Year was proposed for 1932–3 and, because Weyprecht's faith had been so amply justified in the first Polar Year, the idea was well received. Again meteorology, geomagnetism and the aurora were important elements of the programme. This time forty-four countries took part and twenty-two of them organized special expeditions. In the Arctic there were ninety-four meteorological stations.

Between the Polar Years a new subject had appeared which, it seemed, would repay cooperative international study. During the first Polar Year, Balfour Stewart suggested that there might be a region in the atmosphere in which an electrical current might be flowing. Marconi's startling experiment of sending wireless signals from Cornwall to Newfoundland around a large part of the curved surface of the earth led Kennelly of Harvard and Heaviside in this country to suggest the existence of an electrically conducting layer in the high atmosphere which acted like a mirror in the sky reflecting radio waves. This is now called the ionosphere and in its scientific examination, especially in the 1920's and early 1930's, Sir Edward Appleton has played an outstanding part.

In the second Polar Year the scientific study of the ionosphere was in its infancy and there were only a handful of stations; one of these was in Tromsö in Norway, where Appleton led an expedition. The information obtained was not voluminous but it was very important. We now know that the ionosphere, which extends upwards from about 45 miles high in the atmosphere, is a layer or series of layers of charged ionized gas which can conduct electricity and can reflect radio waves as predicted by Kennelly and Heaviside. We know too that it is greatly influenced by sunspot activity. I need only remind you of the uncertainty of good long distance radio reception to indicate how the behaviour of the ionosphere can concern all of us in our homes.

Another important development was taking place at the time of the second Polar Year, this time instrumental. The meteorologist wanted information about the atmosphere above the surface of the earth and what we now call the "radio sonde"

was being designed. This consists of an instrument which can measure temperature, humidity and pressure, to which is added a radio transmitter. It is carried by a balloon up to 30,000 feet or higher and sends radio messages to the ground telling the observer at each stage in its flight how hot, how wet and what the pressure is as it makes its way upward. The radio sondé was in its early beginnings in 1932–3 and was perfected during the Second World War. Nowadays it travels to greater heights and can also carry a reflector for radar pulses which enables wind speeds to be measured.

Another phenomenon which had some study in the second Polar Year was the cosmic radiation. This consists of elementary particles from outside the earth. The source still remains somewhat of a mystery. They possess great energy and when the so-called primary cosmic rays collide with other elementary particles on the fringe of the earth's atmosphere they generate secondary or low-power cosmic rays, many of which penetrate to the earth's surface and indeed are passing down through this room at this moment. This second Polar Year was again a great success.

By 1950 the meteorologist had further improved his techniques for studying the weather and the ionospheric physicist greatly improved his methods, many of which were now quite automatic. The rocket, an engine of destruction in the Second World War, had become a valuable research tool—thanks principally to American scientists. Indeed, the rapid pace of developments had provided scientists with greater instrumental and other resources for their studies. This being so, it was not surprising that there was a call for a third Polar Year and in the forefront of those who asked for it were the ionospheric physicists, for whom the second Polar Year had been so valuable. It was suggested that this third cooperative study should take place in 1957–8 at a time when the sun would be in a period of sunspot maximum, and when the sun's influence on terrestrial phenomena was likely to be pronounced. This idea was warmly welcomed and quite soon it was recognized that this third international effort should cover all latitudes, so as to obtain as complete a picture as possible of the physical forces acting on the whole earth; so was born "The International *Geophysical* Year," and not simply a *Polar* Year. At this time, too, the Year was extended to eighteen months to encompass all the observations that were to be made.

This decision called for a considerable enlargement in scope of subject and scale of effort. Planning began in earnest five years ago and the first step was to prepare a list of subjects for study. The first principle in programme building was the selection of subjects that require international cooperation for their proper study.

First.—Phenomena in the earth's *atmosphere*—meteorology, ionospheric studies, geomagnetism, aurora and cosmic rays.

Second.—Studies concerned with the earth's *surface*—including oceanography, the ice cover and precise latitude and longitude measurements.

Third.—Studies concerned with the earth's *interior* such as earthquake and gravity measurements, particularly in places not visited (or rarely visited) before by geophysicists—for example, Antarctica.

Later in the planning a new section was added, namely the measurement on land, sea and air of the nuclear radiation present. This, like some of the measurements in other sections of the programme, will provide a record of the present position for comparison at a future epoch when similar studies will be made.

Besides these subject divisions a special section of the I.G.Y. programme has been devoted to the new and rapidly developing techniques of rocket and artificial

satellite exploration of the upper atmosphere—techniques which impinge on several of the subjects under examination. The effort is a vast one. Scientists from some sixty-seven nations are contributing, each according to its resources of scientific manpower and facilities. The observational phase of the I.G.Y. began on July 1 last. The following table gives some idea of the number of stations involved in each subject and the extent to which the United Kingdom is participating.

THE INTERNATIONAL GEOPHYSICAL YEAR

(A station is defined as a place where observations in one discipline are made, thus a site making observations in, say, two disciplines is regarded as two stations.)

Subject division	*Number of stations* (At 31 May 1957)	*Number of United Kingdom stations* (Some jointly with other nations)
Meteorology	1603 *	65 *
Geomagnetism	276	10
Aurora and Air Glow	270 *	18 *
Ionosphere	291	25
Solar activity	119	5
Cosmic rays	136	5
Longitude and latitude	78	3
Glaciology	84	7
Oceanography	200	10+5 ships
Rockets and satellites	47	1
Seismology	335	11
Gravity measurements	191	6
Nuclear radiation	—	20
	3530	190

* These are principal stations only and there are many other auxiliaries.

Let us first consider some of the studies concerned with the earth's surface. A few months ago it was reported that the United States Air Force had determined the distance between Washington and the coast of France and that this was classified as "top secret." This is not so silly as it sounds as apparently uncertainties exist in intercontinental distances to as much as 300 feet. Included in the latitude and longitude programme of the I.G.Y. is the use of the new moon-position camera which photographs the moon against a background of stars and by using this as a triangulation point it is hoped to achieve an improvement in mapping the world by relating more exactly the geodetic networks of the continents. Twenty such cameras are positioned throughout the world and are in use for this purpose. Comparison of I.G.Y. determinations of geographical coordinates with past and future latitude and longitude values will tell us whether the continents are drifting apart.

Some fifty ships are cooperating in the oceanographic programme, which includes a more intensive study of the balance between arctic and temperate currents in the Atlantic and Pacific Oceans. Tide gauges and long wave recorders have been installed in out of the way places to supplement existing pre-I.G.Y. installations

and it is hoped to obtain a better understanding of the generation and propagation of long sea waves which travel backwards and forwards across the whole width of the ocean and simultaneous observations over a wide network are needed to study them properly.

A comprehensive world survey of glaciers is also being made. British studies are being carried out in East African territories on Kilimanjaro, on Mount Kenya and on Ruwenzori, as well as in South Georgia and on the Antarctic mainland where an attempt to measure the total content of the ice cover is being made. Present estimates indicate that it represents 8 per cent. of the world's glacial area. Further evidence, from the melting of glaciers, of the gradual warming-up already detected in certain northern hemisphere regions will be sought. There is, for example, the change over twenty-six years in the Saskatchewan Glacier in Alberta. Between 1922 and 1948 the recession of the tip of the glacier was 2600 feet. Measurements of this kind coupled with those on mean sea level will enable us to forecast any long term danger of submersion there may be to low-lying coastal towns from the melting of the ice cover.

Many aspects of the circulation of the atmosphere—one of the problems first tackled by Halley—are not yet completely understood. It is important to understand the process which transports warm air from the tropics and by evaporation transports water from the ocean to the land masses. The prime object of the meteorologist in the I.G.Y. is to determine, if possible, the pattern of winds around the earth. Many problems remain unsolved: what, for instance, is the cause of the 200 m.p.h. jet stream? The meteorologist's chief instrument for his study is, of course, the radio sonde. Thousands ascend daily in accordance with a carefully pre-arranged I.G.Y. timetable. Among his other world-wide studies during the I.G.Y. the meteorologist is measuring the amount of sunshine reaching the earth's surface and measuring the layer of ozone gas which shutters off part of the sun's radiation. By receiving radio waves from lightning flashes, he will also keep a continuous record of thunderstorm activity which goes on somewhere or other in the earth's atmosphere throughout the whole twenty-four hours of each day.

The sun—the energy-provider—will be kept under constant watch by daily visual, photographic and radio observation. The solar patrol will intimately record the sun's behaviour from minute to minute during the eighteen months of the I.G.Y. The I.G.Y. was planned to take place at the period of sunspot maximum. These maxima occur about every eleven years, but no planners could have foreseen how fortunate the choice of 1957/8 was, as in fact it has already proved to be, by sunspot numbers. Records have been kept for nearly 200 years but at no time have they been as high as they were in September and October of this year. Often associated with sunspots are outbursts on the sun called solar flares. They are areas of unusual activity and they emit radiation of two main types, which we can describe as waves and particles. Both of these have effects on the earth's atmosphere. We can regard the radiation in three parts. If we look first at the right-hand side of Figure 1 (p. 23) we note the *wave* radiation which has a travel time of 8·3 minutes. These *waves* have three components: first, on the extreme right, the ultra-violet and X-rays, of short wavelengths. These disturb the ionosphere, and the resulting radio fade-outs can be readily detected. The astronomer using his telescopes can record the visible light which is the second component, and the third component is the long wavelengths which are recorded by radio telescope. All these three manifestations of solar flare emission happen at the same time and are noted on the earth after the time that it takes the radiation travelling at the speed of light

(186,000 miles per second) to reach us over the 92 million-odd miles between the sun and the earth.

The magnetic storm *particles* which are emitted from the sun will, of course, only have an effect on the earth if the earth and its atmosphere lies in their pathway. They travel at an average speed of 1000 miles per second and begin to arrive at the earth's atmosphere some twenty to forty hours after the *wave* effects have been noticed. Now here we find a correlation between the phenomena which the workers in the earlier Polar Years had studied. These particles are the cause of the storms which made the magnetic needles fluctuate suddenly. They are known to be closely connected with the appearance of the aurora and the impact of these particles on the ionosphere causes ionospheric storms with consequent severe disturbance of radio reception.

In addition we have, travelling at a much higher speed, a speed approaching that

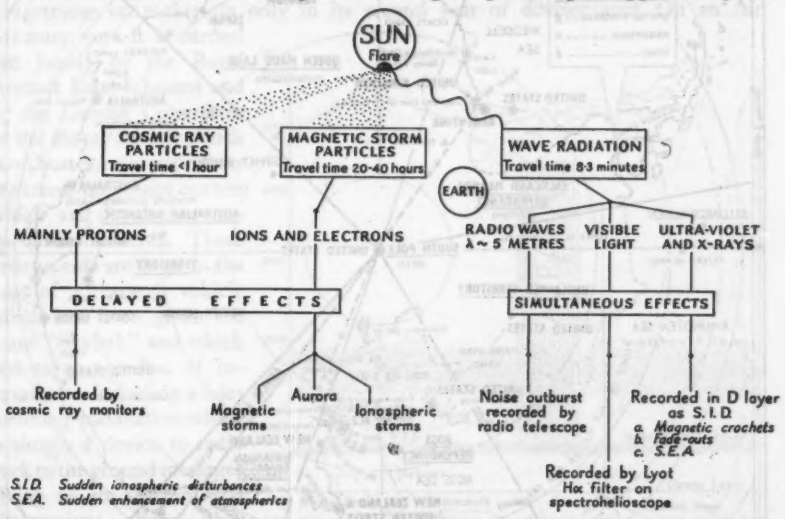


Fig. 1. Terrestrial effects of solar flares (reproduced by courtesy of Dr. M. A. Ellison)

of light, the *cosmic ray* particles. They are charged atomic particles and during the I.G.Y. their incidence from the sun and elsewhere will be very carefully measured by an extensive world network of cosmic ray stations. This will be the first survey of its kind ever undertaken. High-flying balloons carrying equipment to register the incidence of cosmic rays are being used as part of this study. The *magnetic storm* particles, as they approach the earth's atmosphere, are attracted by the poles of the earth's magnet and the associated phenomena are more pronounced in the Polar regions. It is for this reason that the Arctic and the Antarctic are important regions for I.G.Y. studies. Arctic observations were made in the first and second Polar Years but until now no corresponding scientific study has been made in Antarctica. For the first time information is being gathered together from some fifty stations situated around the South Pole which will reveal whether these phenomena have the same behaviour patterns at the South Pole as at the North Pole. The Antarctic programme includes much else besides, such as Antarctic meteorology.

The Antarctic, as is well known, is difficult of access, which makes all the more remarkable the large number of stations which have been set up. I.G.Y. preparations had to be made well in advance and the stations, manned by twelve nations,

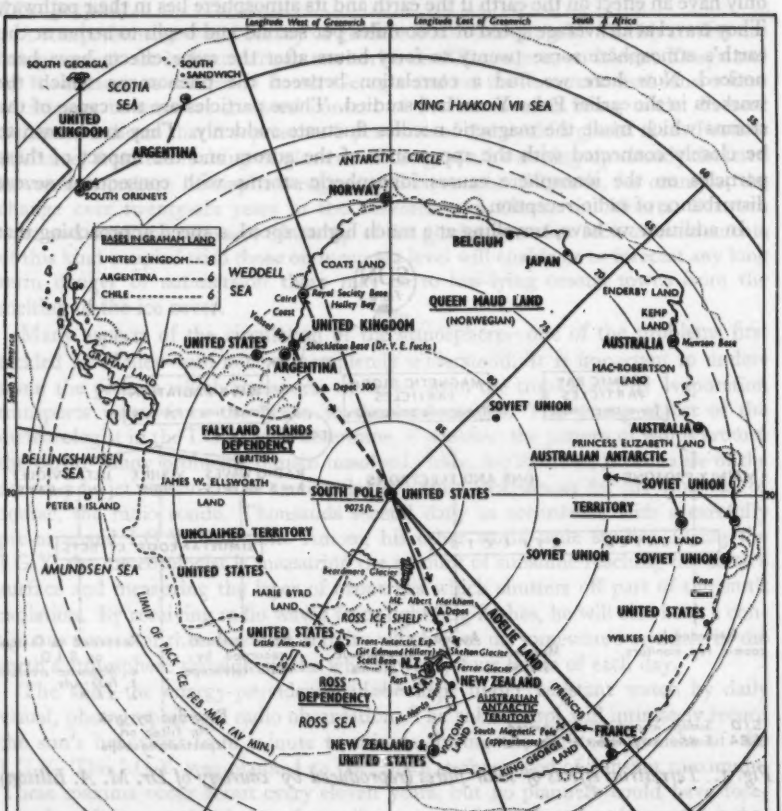


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Fig. 2. Antarctic stations of the International Geophysical Year

may be seen on Figure 2 (above). The Royal Society's station was established on the Caird coast in the Weddell Sea. It was set up early in 1956 and a full I.G.Y. programme is being carried out there.

The motor vessel *Tottan* left for the Royal Society Base on November 22 with

a view to arriving there early in January; on the way she was to call at Norway Base, as she was carrying relief personnel and stores for both. As you can see from the map the name of "Halley Bay" has been given to the area in which Royal Society Base has been placed. This was done as a mark of esteem in 1956, the tercentenary of the birth of this great pioneer geophysicist. So much publicity has been given to Antarctic activities that I ought to emphasize that the Arctic is also receiving quite as much attention in the I.G.Y. programme.

In Figure 3 is a rough diagrammetric indication of the atmospheric height at which certain geophysical phenomena occur. Some of these can be investigated from the earth's surface but if it were possible to take our instruments into the upper atmosphere we could make measurements on the spot. This can be done by sending up rockets and during the I.G.Y. this is being done by the United States, the U.S.S.R., Australia, France, Japan and this country. The British research programme on rockets is only in its second year of development. On an Air Ministry vote it is carried out jointly by the Royal Aircraft Establishment and by the Gassiot Committee of the Royal Society which coordinates research efforts at various university centres which are developing airborne instruments. These instruments are to go in the nose of a research vehicle which has been given the name "Skylark" and which can carry 150 lbs. of instruments, including a telemetering installation which is simply a device to radio back to the ground messages giving us its instrumental observations. Four Skylarks have been launched from the Woomera Rocket Range in Australia—the fourth just over a fortnight ago. These have been test firings only and have established the practicability of the operations planned. Skylark No. 4 did, however, carry out one or two preliminary experiments to heights of 80 miles or so. The U.S.A. and Australia are proposing to use rockoons, *i.e.* rockets which are carried through the lower atmosphere by balloon and then fired in the thinner regions of the atmosphere. This gives a greater height than the rocket would reach otherwise. These will also be used from ships.

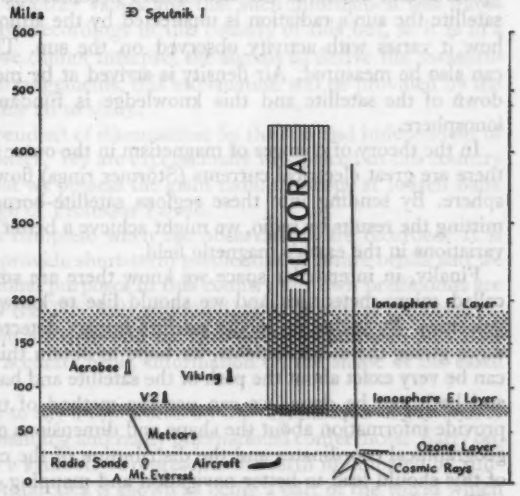


Fig. 3. Diagram indicating atmospheric height of various geophysical phenomena

There are limitations, of course, to exploration of the upper atmosphere by rockets. The sampling and the measuring are very localized and last only for a very short period of time. It was because of this that a desire for an artificial earth satellite arose, what our American colleagues describe as a "long-playing" rocket. The artificial earth satellite can reach far out to the fringe of the earth's atmosphere and can make continuous observations for a very long time. The value of such an

experiment was discussed by the ionospheric physicists meeting at The Hague in the summer of 1954, and I well remember the Rome I.G.Y. meeting in September of that year when it was resolved that an attempt should be made to launch an artificial earth satellite. Nine months later President Eisenhower announced that the United States would attempt this and since that date we have been kept fully informed of all the preparations for the scientific experiments which will be carried out in the U.S. satellite. It was in September of 1956 that the Chairman of the I.G.Y. Committee of the Soviet Union announced that his country too intended to send up artificial satellites. As you all know, the first satellite was launched on 4 October 1957, and a second was sent up by the U.S.S.R. about a month later. The kind of information we hope to obtain and indeed are already obtaining from the satellites circling the earth at this moment relates to properties of the earth's atmosphere, micro-meteorites and geodetics. The earth's atmosphere is divided roughly into the lower or weather atmosphere, and the ionosphere, and as we go upwards and outwards the atmosphere becomes less dense. In the region of the satellite the sun's radiation is unaffected by the atmosphere and we can measure how it varies with activity observed on the sun. The primary cosmic radiation can also be measured. Air density is arrived at by measuring the drag or slowing down of the satellite and this knowledge is fundamental to the theory of the ionosphere.

In the theory of changes of magnetism in the outer atmosphere it is thought that there are great electrical currents (Störmer rings) flowing in and beyond the ionosphere. By sending into these regions satellite-borne magnetometers and transmitting the results by radio, we might achieve a better understanding of aurora and variations in the earth's magnetic field.

Finally, in interstellar space we know there are small solid particles which are called micro-meteorites and we should like to know more about their sizes and velocities. By including in the satellite impact detectors and receiving radio messages giving the measurements, we hope to obtain this information. Providing we can be very exact about the path of the satellite and have a high accuracy in timing, and both can be done, we can use the method of tracking and triangulation to provide information about the shape and dimensions of the earth, to obtain precise geographical coordinates and the distribution of the crustal mass of the earth. All of this should lead to better navigation and mapping.

The artificial satellite age has come. The prodigious achievement in the U.S.S.R. last year has opened a new door to mankind and we are all most interested to know what may lie ahead. Mention has been made, for instance, of telescopic studies made from satellites outside the earth's atmosphere. The inclusion of a dog in Sputnik II would be purposeless if manned flight were not contemplated. My native caution prevents me from saying anything about that but I should like to tell you of what I regard as a remarkable performance by British scientists in the past year. The moment the news of the launching of the first Soviet satellite was received, a large number of scientists and scientific institutions in this country improvised or adapted their equipment to make observations on the satellite with astonishing success. It would take too long to mention them by name but at the Royal Society we have evidence of what they have done and it is very commendable. We have had for some time now in our I.G.Y. organization an Artificial Satellite Sub-committee and some preliminary planning had already been done. It did not, however, amount to very much but it enabled us quickly to organize discussion among the scientists concerned and after the first flush of

excitement and improvisation we have in preparation a plan for the United Kingdom's participation in the observational programme of future satellites.

Observations can be grouped into three main classes. First, *visual* or optical; second, *radio* reception when the satellite is transmitting; and third, *radar*, which essentially consists of sending out pulses which are echoed from the satellite and received back by the sender. So far as I know, no visual record of the *first* small satellite itself has been made in this country, but the first rocket and Sputnik II have been seen and photographed many times now. By radio methods a vast quantity of valuable information was collected during the three-weeks' transmission from Sputnik I and the one-week's transmission from Sputnik II. This information is of immense interest to the ionospheric physicists. For the first time they have had a transmitter circling the earth outside the ionosphere at some parts of its flight and in the ionosphere during others and they are very excited about it. The Soviet scientists have told us that the second satellite carried instruments to measure solar and cosmic radiation as well as other values and that such information was transmitted to the ground. We have recordings in this country of this but, as it is in a code as yet unknown to us, we cannot interpret the signals to derive the measurements made. Under I.G.Y. arrangements, this information will be provided by the Soviet Academy of Sciences for all to share.

The *radar* method is independent of illumination by the sun and independent of a satellite-borne radio transmitter. We are exceptionally well placed in this country for radar measurements in that we possess the giant radio telescope at Jodrell Bank near Manchester in the charge of Professor Lovell.

The story is by no means complete when the observations are recorded. It is necessary to analyse them to provide short-term predictions of future orbits and we have found that for observational purposes in this country our own predictions are much better than those from the U.S.S.R. and the U.S.A. Study of the observations will give information on air drag and on ionospheric conditions, and after careful computing of a very accurate orbit, information on the shape of the earth can be derived.

In conclusion I would like to say a few words on the organization of the I.G.Y. which has involved years of planning and many international conferences. Early on, the planners gave themselves a symbol. It represents the earth illuminated by sunlight and partly in shadow. Antarctica is shown as being a part of the world which would receive particular attention and the orbiting satellite speaks for itself. As a symbol of one world under investigation the satellite is very appropriate.

Just as there must be a selection of subjects and a selection of a programme of appropriate observations within a subject, so an I.G.Y. calendar involving a selection of dates was drawn up. In it are designated certain Regular World Days (about three or four each month) when the observational programme is intensified. Many observations are made daily at prescribed times but a special concentrated and synchronized effort is made on Regular World Days. Six World Meteorological Intervals, each of ten days, are designated for a specially intensive meteorological programme. The I.G.Y. calendar was distributed many months before the observational phase began.

A selection of zones for concentration of sites for observation was also made. These are the Arctic, Equator, Antarctic, and three meridians, one through the Americas, one through Europe and the third through the U.S.S.R., Japan and Australia.

Following the planning phase and the observational programme, the third phase

is ahead of us, but already an elaborate scheme is in operation for the collection of observations into three world data centres. Centre A is in the U.S.A., centre B in the Soviet Union, and centre C is split in many parts among various research institutions throughout the world, where are to be found special knowledge and skills in dealing with the respective subjects of study. The I.G.Y. has a publication programme. Its principal medium of publication is the *Annals of the I.G.Y.* To ensure standard methods of observation a series of instruction manuals have been issued in the *Annals* and it is hoped that the *Annals* will play a useful role in placing on library shelves some of the essential data derived from I.G.Y. observations now being collected in the data centres.

A World Alert System is used in conjunction with the solar patrol and when the sun is seen to be likely to be unusually active, and consequently will cause many geophysical phenomena to occur, I.G.Y. observers everywhere are alerted and special *extra* observational efforts are made. The messages emanate from the I.G.Y. World Warning Agency in the U.S. National Bureau of Standards at Fort Beivoir, Virginia, and radio, telegraph and telephone links based on existing meteorological telecommunications networks are used to communicate to national networks. The G.P.O. take over in this country after the message is received at the Dunstable Meteorological Office Telecommunications Centre. The B.B.C. also helps in distributing the alert warning by announcements, thought by some to be somewhat mysterious, after the 11 p.m. news on the days when an alert is in operation.

That concludes the current instalment of the I.G.Y. story. We are seeking new knowledge about our planet which no single nation alone can acquire. There are practical rewards in the prospect of better weather forecasting, better radio communications, improved stratospheric flight, and in many other ways. However that may be, it is already evident that in the I.G.Y. it has been demonstrated that scientists of all nations can work harmoniously together for the common good. Perhaps there will be an example and a lesson here. If it is taken up we may yet look forward to the time when the excitement of finding out, with the power for good such knowledge can bring, can take place on man's planet without the shadow of the fear of war. If and when that day dawns, what prizes may yet lie before us!

DISCUSSION

Evening Meeting, 2 December 1957

Before the paper the PRESIDENT (General Sir JAMES MARSHALL-CORNWALL) said: Last July marked the opening of the International Geophysical Year of 1957–8. Let us call it for short the I.G.Y. Some of you may want to ask me: Has the I.G.Y. any connection with geography. My answer to that is: Decidedly yes. In former days geographers mainly confined their studies to the lithosphere, hydrosphere and atmosphere of the earth, *i.e.* the solid crust forming the land masses, the oceans surrounding them and the envelope of air which enables organic life to exist. But beyond the atmosphere there are other more remote layers, such as the ionosphere, and the physical phenomena occurring in these regions definitely affect the life and activities of people on this planet. The geographer must therefore now raise his ceiling and extend the range of his studies; in short, he must become space-minded. But specific research in these remote and uncharted regions of the earth's periphery requires the concentrated efforts of the world's scientists; hence the reason for the I.G.Y. and its importance to geographers.

The I.G.Y. owes its origin to the bright idea of an officer in the Austrian Navy

eighty years ago. In the year 1875 this Society awarded its Founder's and Patron's Medals respectively to two Austrian naval Lieutenants, who two years previously had made the first discovery of Franz Josef Land—that icebound Arctic archipelago to the east of Spitsbergen. Their names were Karl Weyprecht and Julius Payer. Karl Weyprecht (a German by birth though commissioned in the Austrian navy) was not only a successful polar explorer, he was also a scientist and a man of original ideas. One of his ideas was that it was extravagant in money and effort for countries to send out isolated Polar expeditions, which seldom achieved scientific results but tended merely to satisfy national prestige or personal glorification. At an international congress he pointed out that it would be far better to coordinate research for a whole year in Polar regions in order to make simultaneous observations at a number of stations for a definite purpose. The results could then be pooled and correlated. This novel idea caught on, and in 1882/83 the First International Polar Year was organized, when eleven countries pooled their resources and results in concerted observations as regards meteorology, geomagnetism and aurora. Fifty years later a Second International Polar Year was established in 1932/33, and another twenty-five years later brings us to the present Third International Polar Year. The International Council of Scientific Unions decided, however, that this year's effort should be on a global scale, so it has been expanded into the I.G.Y. with sixty-seven countries participating.

We are indeed fortunate in having Dr. D. C. Martin to explain the working of the I.G.Y. to us. He is the Assistant Secretary of the Royal Society, which is the focus and forum of scientific research in this country, and he is also secretary to the British I.G.Y. Committee.

I would also like to welcome an old friend of ours, Sir David Brunt, who I hope will afterwards make a few comments on Dr. Martin's lecture. Sir David is an eminent meteorologist and physicist; until yesterday he was the senior Honorary Secretary of the Royal Society and has had much to do with organizing the British contribution to the I.G.Y.

Dr. Martin then read his paper

After the paper Sir David Brunt said a few words.

LANDSCAPES IN CARIA I

FREYA STARK

The few travellers who, after visiting Smyrna and the well-known cities of Ionia, have wandered further southward, agree in calling this Turkish coastline one of the most beautiful in the world. History, and nature, and solitude combine to make it so, and the mountainous peninsulas which discourage even the modern Turkish road-builder have hitherto kept the country and its ruins intact. I have visited here several times, by sea or land, and have written a book on Alexander's march through Lycia which is now in Mr. Murray's hands. But the northern part of the coast, from Miletus through Caria, did not fit into my general scheme; and as it seemed to me to be full of interesting oddments of history, I have written this article, describing a sailing from Samos to Bodrum, and a second one to record a land expedition through the ancient cities of Caria.

AEOLIA, IONIA and Caria; Lycia, Cilicia, Pamphylia—the coast has spun these vowels, and sinuous s's and rocky r's and k's, out of its summer waters and whispering caves and hard eroded headlands wrapped in liquid melodies—the very syllables of the Aegean.

And when monotony fostered as in our day becomes depressing, we may remember, almost by merely repeating the names, that there is still here a refuge of various but unchanging beauty, a patrimony which the human race has looked at from its childhood, either watching the sea barefoot from some height, or gazing, from the first boats ever floated, towards the land. These two opposite points of view divide the seafarer and the landsman, or oneself for that matter, according to one's mood.

I am happy to gaze from a dove-coloured peninsula and, leaning as if against a balustrade, to feel the sunlight of the rock safe against that blue darkness, against the Siren's depth and the idle streams that no aqualung can fathom, whose ends are lost in crowded shifting voices and the certainty of death.

To look at the land asks less of the human imagination. Here, too, the promises of the bays are hidden, but they draw inexorably and inescapably nearer like an approaching wedding day, and are soon to be revealed. One gazes at them with the interest of an almost immediate implication. And perhaps, after all, the most peaceful and happiest condition is to keep away and coast in fairly shallow water, and to watch the world from a reasonable distance, neither too near nor far.

This is what we were doing in the *Elfin*, along the Carian coast, with the theatre of Miletus far away to port, and the five fingers of Mount Latmos behind it. They shone beyond an avenue of low promontories, in the pale mists of the Maeander marshes, small and sharp on an immense stage suffused with light. The water too shone, and the whipped white clouds piled up on the horizon. It was spring, even at sea. The undulations of the coast slipped into distance, in fugues that followed one another. We passed wide of the now pastoral harbour of Panormus, and saw the three columns of the Didymean Apollo among trees; and as the morning grew to noon, we turned a corner where Neleus built an altar to Poseidon, once the boundary between Ionia and Caria.

The sea was as quiet as a sleeping cat, and lapped the stones of the foundations, dark green with time and water; and the altar lay, with a fallen marble column, a heap of rubble above. The Turks had recently built a whitewashed lighthouse

close by, straight and short like a finger, and this—alone beside the altar, between the coast and the clouds—carried the tradition of the promontory with a cheerful solitary air into our lesser day.

The Mendelian gulfs open like a hand, and we lunched in a cove and spent the afternoon sailing from one to the other, and came with the declining sun to Güllük, the port of Milas, the ancient Mylasa. Here tidy houses, a customs building and jetty, a caique and six lighters, drowsed in that agricultural calm which has smothered the southern Turkish sea. A heap of crushed olive stones seemed to be all that was waiting to be exported—to the United States: but emery too is worked here, by a small and adventurous English mine in the Milas plain.

The few ships that come to carry it away furnish the doctor of Güllük with his only occupation: so he was at leisure to join us and fish, and pull one *vlachos* after another out of the sunset water, while D.B. continued without perturbation to entangle his expensive metal bait in the floor of the bay. The fish were fat, of a tweedy beige with white waves; and when he had caught them, the doctor pressed their eyes out and they lay still, like the Byzantine kings.

The evening was exquisite, with one star in a nectarine sky. Squat hills descending begin once more to show the ancient jade-green of the olive, for the government encourages peasants in this forgotten cultivation. It gives a strip of stony land free after five years if they will clear it, uprooting the scrub and leaving only the wild tree which is grafted where it stands; and a Milas notable has bought this fertile land, with its *dalyan* or fishery at the end of the bay, and the ruins of Iasus in almost uninhabited wildness at its western corner. A fan of cultivation and scraps of ruins and aqueducts open up under an acropolis crowned with a heart-shaped later wall, Venetian or Crusader; and the shell of a medieval castle stands before it in the shallow sea.

Iasus was an island city—a customs-station for Rome—and ceases to be mentioned after the Mithridatic wars though it counted four gymnasia in its time. The remains of its fine theatre are there, and clustered houses on the southern slope, and a few dingy cottages are scattered among loose enclosures, by a muddy isthmus strewn with cornices and columns. The city walls climb up the deserted hills, enclosing solitude. Their date is disputed[1]—Hellenistic or earlier—and their oval bastions, their monolith-lintelled doors and windows, their sentry-walk cracked by earthquakes, and zigzag device to increase the defenders' fields of fire—all are worn but still solid, as if life had drained away and left them like the streak of an empty snakeskin patterned with mossy patches, forgotten on its hill. Terrible things happened in Iasus before the wall was built. Twice sacked in seven years, its men were killed and its women sold—"a Doric stater was paid for every captive"; and a great booty was found, "the place being wealthy from of old." For the Spartan ships in the fifth century B.C. were taken to be friendly Athenians, and welcomed by the defenceless town.[2]

There are pleasanter and eccentric memories too. An Iasus philosopher was rash enough to educate five daughters as dialecticians and call his servants by small grammatical words like But, or Indeed, or Why, to show that he was the master and not the slave of language. And the boy loved by a dolphin came from Iasus, carried on its back in the bay when he bathed from one of the gymnasia by the shore. When he died the dolphin brought him in and lay down to die beside him, and the people of Iasus made a tomb for both together and engraved the fish on their coins. Alexander, who had a superintendent of his armoury from this city, was said to have sent for the boy as he passed by, and made him priest of Poseidon.[3]

The shrimps of Iasus were praised by a Sicilian poet, and the stories that still seem alive among its ruins are those that deal with the sea. Even they have a slow quality about them, to fit the calm indentures of these bays. When a strolling musician came to play, the people listened till a market bell rang for the sale of their fish and all except one deaf man left him.

"I am obliged to you," said the artist: "for the rest have gone at the sound of the bell."

"What," said the deaf man: "Has it rung?" and hurried off. And one may remember that it was a ship from Iasus, a sluggish sailer, that alone was captured by the men of Alexander in Miletus, amid the Persian fleet.[4]

Even more remote, more uninhabited and more deeply forgotten is Bargylia, in which Philip V of Macedon spent a winter fighting, and Rome first gave its freedom to a city of Asia.[5] It is difficult to find, though only half an hour's sail from Güllük, up an inlet that opens among hills. Not a house was in sight when we sailed here nor any sign of animal life except some cattle grazing, and two boats fishing in the sound.

The water grew too shallow for the *Elfin*, and the dinghy landed us in swamp among rushes as sharp and painful as miniature javelins. From tussock to tussock we gained the city's slopes. Stone or marble showed it here and there, blanketed in grass among the yellow iris, with white columns laid on their sides by the Byzantines and used for a foundation.

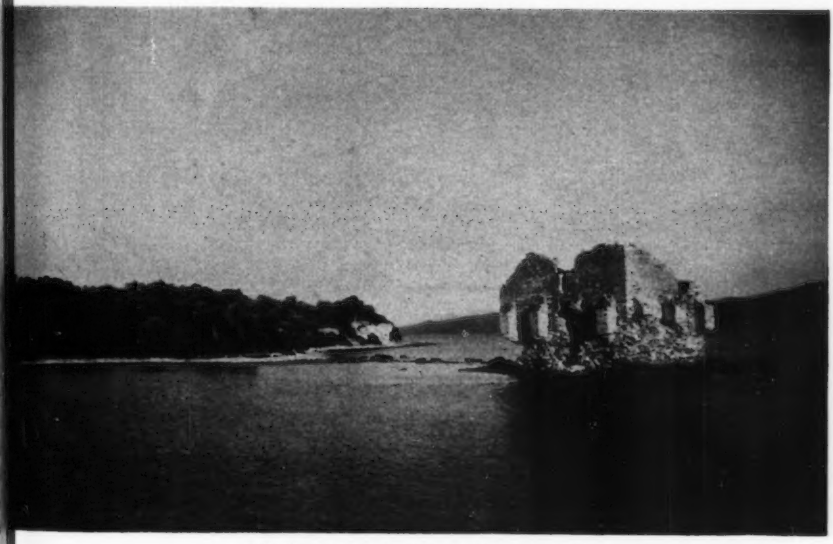
The buildings that Newton described a century ago are still visible, dim to recognize and a little more covered in earth beside a theatre that was turned into a Byzantine castle and then ruined. A village, "destroyed by pirates like many small places along the coast during the Greek revolution,"[6] had left no trace that we could see. But the view inland showed hamlets and sparse tillage, and a causeway running south across salty flats that give the place (Tuzlu) its name. It is only eight hours' ride from Halicarnassus, according to Murray's 'Handbook,' and Alexander's route probably passed either by the city or a mile or so inland, where the modern way runs through Eğerciler.

We were not thinking of Alexander, nor of the roads down the peninsula that he may have taken. We were thinking of nothing. The hillside outlines were blurred with spring; the sky leaned gently upon them. The boys in the sound made the landscape even more lonely. They had two boats with a net between, and beat the sides with heavy poles clubbed at one end which they threw to make splashes in the water. The grey mullet leaped with gaping jaws, and eels got in and ate them from inside as they swam with their mouths open, so we were told, as if it were a Nanny's story. The water looked smooth as the Thames at Cliveden on a summer's afternoon. In the south the causeway spread across spits of sand.

A Yürük came up with friendly manners to offer the hospitality of his tent. No one, said he, came to Bargylia, except the sister of the member for Milas, a good young archaeologist, who had looked—he waved his hand over the prostrate temples, odeon, stoa, fluted columns, that lay as if asleep under the grass. The *Elfin's* engine was now beginning to splutter as she drew towards us, leaving a furrow in the sound scarcely bigger than that of the centuries before her; and we coasted south till the night came upon us in a landlocked bay, so still that one felt one could weigh the darkness, as if it lay soft and heavy in one's hand.

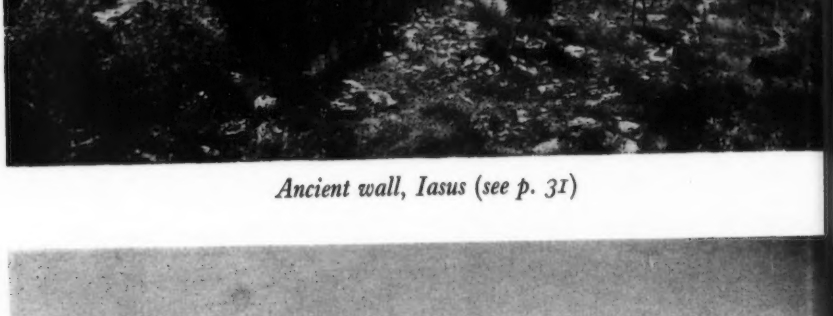
The name of the bay was Güvercinlik, a "place of doves," and I was awakened next morning at six by a shepherd piping on the hill. Wild olives, a few camels, a patch of corn were there, a stone's throw away, and some late ruins in the scrub with

Altar of Poseidon, coast of Caria (*see p. 30*)



Medieval castle, Iasus (*see p. 31*)

Ancient wall, Iasus (see p. 31)



Bargylia channel (see p. 32)

a few early signs among them—the site of Caryanda, which gave its name to one of the fathers of geography.[7]

We were on our way round the Mendelian peninsula to Myndus, and put out into a dark smooth sea. The air in May was cold; the mountains of Caria crowded through it in pale numberless outlines, as if a herd were pressing towards the water, with rounded backs stooping over rough cliffs below them. But as we edged round this promontory a milder landscape showed windmills on ridges and houses. A ruined monastery stood on an island, and the prosperity of Bodrum and its countryside began to appear.

We breakfasted in a small bay and passed by a solitary rock out at sea, without vegetation and marked by the droppings of gulls, and circled it hoping for the fish who still preferred to die in the ways they always had done and refused D.B.'s English improvements. When we had given them up, we made for the little silver harbour called Gümüşlük Liman, which once was Myndus: a naked rocky islet beside it keeps the name.

Here as at Cnidus, a headland rises steep and pointed from a narrow neck that joins it to the town, but there is only one harbour, well tucked in on the eastern side, and sheltered by a mole and double causeway. All that one can see on the stony ground is the trace of a small temple, a landing stage cut in the rock, and a "cyclopean" wall descending from the height to the foundations of two square towers. Among these the place is free for such poor grazing as the village cows can find.

For, unlike Cnidus, the city of Myndus continues, and there is no desolation, but merely decay. When the modern Greeks were there, before the latest troubles, it must have flourished quietly on its lonely headland: its church is intact and neat, now used as a storeroom by some private owner; and over a shallow rise, behind the powerless little harbour, white houses—two chimneys on flat roofs over two windows and often some little gaiety of decoration—are spread out among gardens of tangerine and fig.

It was here in Myndus that I first began to think of Alexander and his marches through Asia Minor, after reading Arrian's account of the night attempt from Halicarnassus,[8] which is now Bodrum, where the Macedonian besieging army was encamped across the Mylasa road.

Alexander thought that its capture "would be a great help to the siege of Halicarnassus," for some reason possibly connected with the sea, since Myndus is right out of the way on its peninsula; or because it had a silver mine (recorded in the modern name) and money was needed?[9] He had friends who had promised to open the gates from inside if he arrived about midnight; and in this expectation he left his ladders and engines behind, and rode round by the western walls of Bodrum that can still be followed through dusty Muslim cemeteries, along 12 miles or so of a delightful country of shallow pointed hills. Seven windmills on a ridge now make the track conspicuous from the Myndus walls—from which no sign of collaboration appeared at the appointed time. The phalanx was brought up to sap a tower; but its fall did not strip the defences, and enemy reinforcements sailed round in the morning. Alexander's grasp of what was feasible, and his readiness to change or renounce whenever circumstances required it, seem to me one of the most remarkable aspects of a genius at the age of twenty-two. Perhaps the combination of Aristotle and Philip behind him produced the honesty of such a mind trained to look at things as they are? He ordered the phalanx to retreat. Between midnight and noon he came to his decision and the fall of Myndus was delayed for over a year.

I went to look at the walls of Myndus, of which the western side, opposite Alexander's approach and more impregnable by nature, is still piled up today. It shows the ancient city as a triangle, rising at its point on the top of the hill to a square tower. I climbed for an hour, first gently by a path through cornfields in whose loose enclosures marble shafts of column—four to be precise—were settled; and then by an outer path till that turned away. I then continued along the ramparts, throttled with thorny oak and cistus, where the wall ran to a width of 6 to 8 feet along one of the natural limestone ridges that seam these coastal hills.

The very first idea of a wall, I thought as I scrambled, must have come in some such place where nature herself has sketched the defences and the inhabitants began by rolling a few boulders into the weaker gaps. The wall of Myndus shows all the stages, from the natural steepness of the limestone outcrop, to places where fragments as big as men were used to crown it, to the rough rectangular shaping of the outer surface, and the final beauty of the long blocks chiselled with such care. Some later plaster disfigures the topmost tower, but two sides are intact, their stones bearded with lichen, and old. Sitting there, one could hear doves cooing in the landscape, and notice flowers—mauve stocks and yellow achillea—among the rocks.

The eye travelled in peaceful freedom to the southern horizon and islands—Leros, Calymnos, Pserimos, Cos, Lipsis, and perhaps the wraith of Patmos beyond, and sterile rocklets blotted into a blue perspective, at ease in the afternoon richness—the sparkle and shadow of the Carian sea. Promontories stretched out and oxen were ploughing, and the flat lands with fruit trees and houses rose like the curl of a feather to small stony hillocks where the beaches end. The curves of the sea and those of the yellow cornfields ate into the slopes of the hills.

Here the west wall plunges, and so would the eastern but that it loses itself before one reaches what looks like a corner buttress at a house on an isolated hummock. All traces of the old stone vanish, and the path, which once was an old flagged street, becomes a mud lane sunk in fields. But here somewhere, though the plough has covered its traces, the road came in and the Macedonian phalanx sapped the tower; and nothing else in the history of Myndus—from its Cycladic settlers[10] to Cassius defeating the Rhodians in the bay,[11] not anything at all that has happened here—can match the interest of the young man riding away beyond the ridge of the seven windmills, weighing his purposes and leaving the walls of Myndus to the conquest of Time.

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[1] Thomas Fyfe, 'Hellenistic Architecture,' p. 121 (Cambridge, 1936). The date is, however, controversial.

[2] For Iasus see: E. L. Hicks in *J.H.S.*, 8, 1887; Diodorus, 13, 104, 8; Thucydides, 8, 24, 28ff.

[3] Thomas Gomperz, 'Greek Thinkers,' II, p. 204 (London, 1949); for dolphin story: Athenaeus, XIII, 606; Plutarch, 'De Solertia Animalium,' 36; Pliny, 'Natural History,' IX, 8.

[4] Athenaeus, III, 105e; Strabo, XIV, 2, 21; Arrian, I, 19, 11.

[5] Polybius, XVI, 24; Plutarch, 'Life of Flamininus.'

[6] Newton, C. T., 'Travels and Discoveries in the Levant,' II, pp. 56–8 (London, 1865).

[7] Strabo, XIV, 2, 20; Herodotus, IV, 44.

[8] Arrian, I, 20, 5.

[9] Magie, D., 'Asia Minor under the Romans,' p. 51 (Princeton, 1950). Gümüshlu=silver.

[10] Hall, H. R., 'The Civilisation of Greece in the Bronze Age,' p. 60.

[11] Appian, IV, 65ff.

CLIMBING IN THE CAUCASUS MOUNTAINS OF THE U.S.S.R, 1957

JOYCE DUNSHEATH

THE MAIN RIDGE of the Caucasus, while lying wholly within the U.S.S.R., separates the constituent republics of Georgia, Azerbaijan and Armenia in the south from the vast Russian Soviet federation to the north. The whole area, extending some 600 miles from the Black Sea to the Caspian Sea, has been closed to visitors from non-Communist countries since before the Second World War. Indeed, since 1917 there has been practically no contact, for in the period following the Revolution, few people were inclined to travel in this remote area although one does hear of a few visits in the early thirties.

English climbers first became interested in the Caucasus during the second half of the nineteenth century when Freshfield, Dent, Mummery, Donkin and others discovered a new playground for mountaineers. Freshfield, speaking of Svanetia in his comprehensive account of his travels,[1] said "I can count on the fingers of one hand the travellers who had visited the country before 1868" and again "By 1920 it seems probable that the Svanetians will have begun to collect crystals and to make bouquets of yellow lilies . . . and the village headman will have a roll of porters and a tariff for the Tuiber and Zanner Passes." But this influx of tourists was not to be: revolution and Communism sealed off the country.

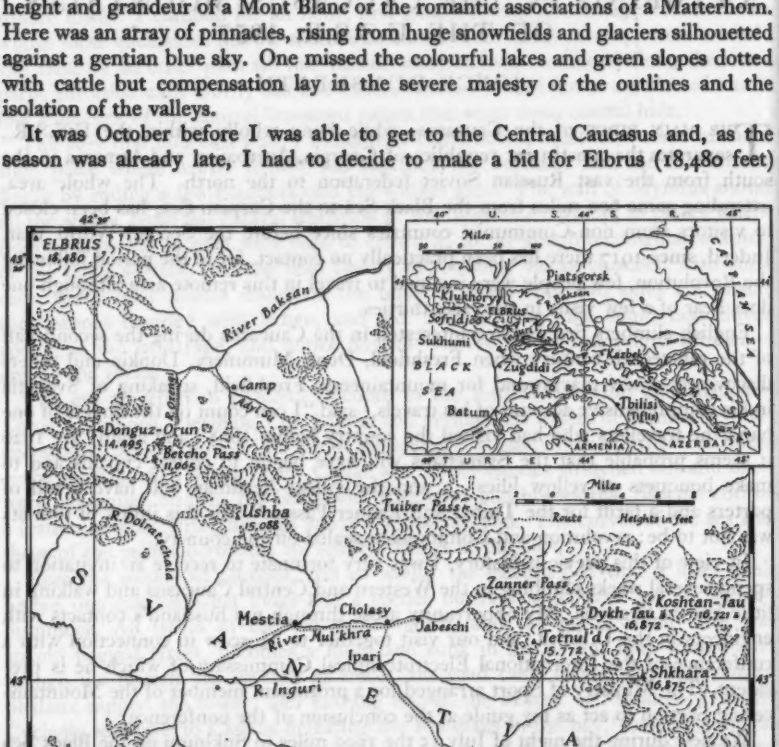
In view of this previous history, I was very fortunate to receive an invitation to spend several weeks climbing in the Western and Central Caucasus and walking in little-known Svanetia. My opportunity arose through my husband's contacts with engineers in the U.S.S.R. and our visit together to Moscow in connection with a conference of the International Electrotechnical Commission of which he is president. The Ministry of Sport arranged for a prominent member of the Mountaineering Section to act as my guide at the conclusion of the conference.

We flew during the night of July 15 the 1000 miles to Sukhumi on the Black Sea and then, changing planes, went on over the mountains to Klukhory. Here we found a waiting bus which took us back into the heart of the Western Caucasus along the course of the Teberda to its junction with the Alabek. After two hours, we branched off into the Dombay valley and pulled up at the wooden buildings of a mountaineering camp built and run by a Trade Union for up to 250 people. Here, for a nominal charge, complete novices can go straight from the big cities, be provided with all the necessary clothing and equipment on the spot, and spend three weeks as one of a patrol of six under the instruction of an experienced leader. At the end of the course of training, they have the satisfaction of making an ascent of a major peak and of receiving a badge and certificate of proficiency. To a western visitor, the formality of the arrangement seems strange, but mountaineering in the U.S.S.R. is a serious business and does not yet seem to have reached the stage of ascents and explorations carried out by the individual on his own initiative for the fun of it. Of course, one has to have the pioneering spirit even to set out with tent and provisions, as the peak in view may be many days' march from a village and there are virtually no huts. In this respect, Alpine climbing seems very sophisticated.

[1] Freshfield, Douglas, 'The exploration of the Caucasus.' London, 1896.

With two Russian mountaineers, I made the climb of Sofridjoo (12,300 feet) after a night near the snow-line at about 10,000 feet. From my tent, I looked out on a scene which, comparable in beauty to anything in the Alps, yet lacked the height and grandeur of a Mont Blanc or the romantic associations of a Matterhorn. Here was an array of pinnacles, rising from huge snowfields and glaciers silhouetted against a gentian blue sky. One missed the colourful lakes and green slopes dotted with cattle but compensation lay in the severe majesty of the outlines and the isolation of the valleys.

It was October before I was able to get to the Central Caucasus and, as the season was already late, I had to decide to make a bid for Elbrus (18,480 feet)



straight away. I flew with my Moscow guide to Pyatigorsk and travelled thence by road to the Spartak Camp in the Adyl Su, a branch of the Baksan Valley. The autumn colouring was magnificent: the deciduous trees of the valley—beech, birch, poplar and mountain ash rising from copses of scarlet-leaved rhododendrons and azaleas—were set against the dark green of the pines and firs of the mighty virgin forests. Above them towered jagged black peaks, their sides clothed in draperies of snow and ice where glaciers, flowing from snowfields at 15,000 feet, came down between granite walls and lost themselves, crevassed and contorted, in the moraine of the lower slopes.

On October 2 the Elbrus party set out, I the only woman with five experienced Russian mountaineers. There was my companion from the Sports Ministry, a meteorologist who had been stationed on Elbrus during the war years, two local men who would act as interpreters with the Georgian-speaking inhabitants and

the warden of the refuge from which we were to make the ascent. A lorry took us up the wide Baksan valley till it narrowed to a fold in the mountains where we transferred to a tractor provided with caterpillar tracks which rolled down the snowdrifts and lurched over hidden boulders till we reached the ice base of the Meteorological Station at 12,675 feet. Here, after a night's rest, we shouldered our packs and plodded on uphill in deep snow under a lowering sky to the "Refuge of Eleven" which was to be our base for the summit climb. This large, curious building, looking for all the world like a very tall underground-railway coach, had already been closed for two weeks and so was icily cold. A fire was soon lit in the closed stove of the room in which I was to sleep and, while the atmosphere was thawing, I took the opportunity of going out on to the verandah to look at the magnificent view.

Elbrus stands slightly to the north of the main ridge and as it tops the next highest peak by nearly 1500 feet, I gazed down on to an uninterrupted view of the Caucasian chain. From Kazbek (16,390 feet) over 100 miles away to the east, peak after peak filled the horizon to the Black Sea, another 100 miles away to the west. In the foreground stood the terrific north face of Donguz-Orun (14,495 feet) and near it horned Ushba (15,088 feet) with its bristling neighbour Shkhara (16,875 feet) dominating the forest-clad valley of the Inguri. I could pick out Koshtan-Tau (16,721 feet) and Dykh-Tau (16,872 feet) rearing their pointed heads above huge snowfields and glaciers to the east and beyond them the more rounded summit of Kazbek, diminished at such a distance to a mere hump. To the west, the mighty wall continued in a series of ridges, black rock rising steeply from a sea of glistening snow till, slightly north of west, they reached the Black Sea, almost hidden in blue mist. This summit view is unsurpassed in grandeur by anything I have seen outside the Himalayas.

Behind the refuge stood the twin peaks of Elbrus seen across a vast white plateau rising more and more steeply till it met the rocks of the final slopes. Distance in the mountains is ever deceptive and it was hard to realize that we should need nine hours of strenuous and continuous effort to cover the distance to the summit nearly 5000 feet above us.

Two days of bad weather allowed only short acclimatizing excursions, but the third day, October 6, dawned clear and at 5 a.m., clad in wind-proof trousers and anoraks worn over down suits and our faces protected against frost-bite by felt masks, we set off. Our chief enemy was the wind which blew with terrific and increasing force the higher we climbed. The altitude, too, weakened our resistance to the climatic conditions and slowed down our pace so that it was three o'clock before we stood on the summit. As we approached the final ridge, a gust, more violent than the rest, blew two of us down on to the ice and the third over the ridge, without however any serious harm. Linking arms, we passed the summit cairn without stopping and did not pause till we were within the shelter of rocks well below the top. Darkness fell before we reached the refuge at the end of a fourteen-hour day of non-stop struggle with the elements. We had won, and I was satisfied, but I could not help comparing this inhospitable spot with that sunny corner of the Bara Shigri Glacier where, in 1956, at the same height of 18,000 feet, life had been pleasant for weeks on end.

It was now too late in the season for any more high climbs so plans were laid to cross the main ridge by the Betcho Pass (11,065 feet) into Svanetia. This is frequently crossed in summer but now we needed the guidance of a local man to pilot us across the head of the glacier and up the crevassed ice slopes to the ridge. The

descent on the far side was steep but we were soon clear of snow and bivouacked that night amid the rocks of the green valley of the Dolratschala river.

The next day we reached Mestia (Seti), capital of Svanetia: "Free Svanetia" it is rightly called, for in spite of all attempts to subdue it by Romans, Persians, Turks, Georgians and Russians, it maintained its independence right up to 1875. Shut in between towering mountain walls, Svanetia still feels little of the impact of civilization and cares nothing for the politics of Moscow. It is a small country roughly 50 miles long by 15 broad, its villages spread along the upper valley of the Inguri. Along the north stretches the main Caucasian range, the immediate peaks—Shkhara, Tetnul'd, Ushba—famed among mountaineers. To the west, slightly lower land gives access (in summer only) to the other parts of Georgia by passes of 10,000 feet while to the south lies the lofty slate range of the Layla whose peaks, sheltering enormous glaciers, rise to over 13,000 feet. There is egress to the Black Sea at Zugdidi by the track of the Inguri, but as the river has to force its way for 15 miles through a gorge bounded by high rock cliffs, it has in the past only been possible to arrive on foot. Up to 1936, a track along this route was the only means of communication with the outside world and few were brave enough to venture into "savage Svanetia." It is small wonder that an Arabian geographer described Svanetia as a lost valley that no one could reach, enclosed by walls 2 miles high and 50 miles in circumference. In 1936, a road was constructed following the old footpath and now there is a daily bus service from Mestia to the Black Sea, a distance of some 200 miles.

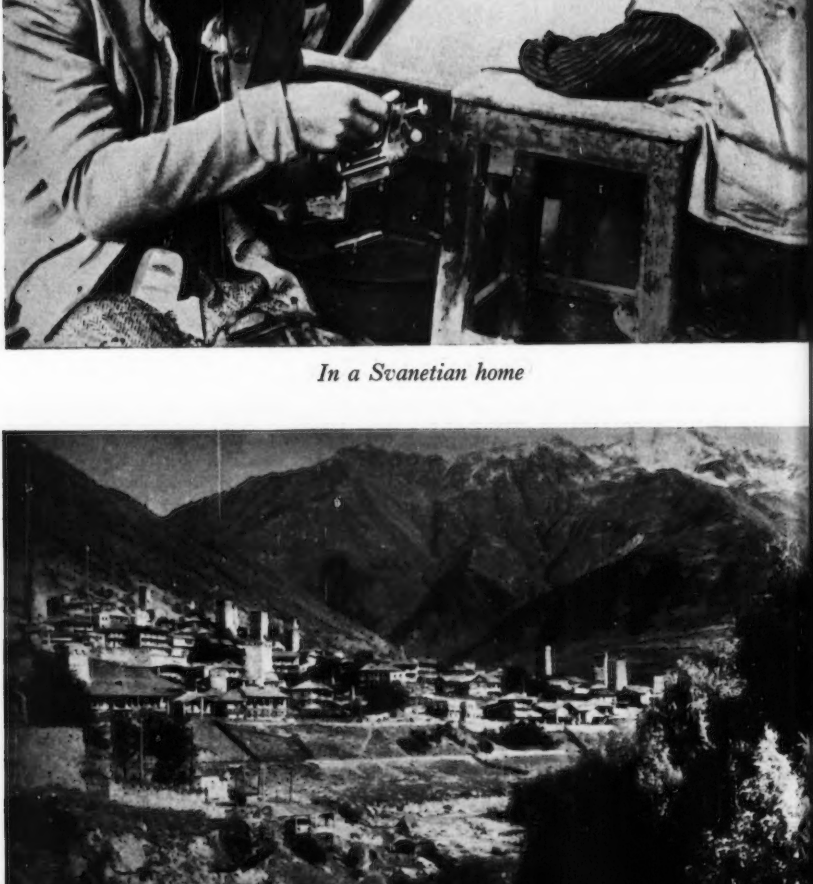
Mestia is proud of being up to date and, although it has no sanitation, boasts a post office from which telegrams can be sent in the Russian and Georgian languages and a primitive hotel for the convenience of the occasional traveller. Here too is the office of the head of the commune and a small museum where relics of the past are being gradually accumulated. On the rough wooden table within, valuable Georgian texts, handwritten on parchment dating from the thirteenth century, lie open for all to thumb. A few modern houses stand in contrast to those of the original village higher up the valley set against the background of beautiful snow-covered Tetnul'd. By the river Mul'khra (a tributary of the Inguri) wooden huts house the vats where *chang*, the local spirit, is distilled and where millstones, turned by the rushing torrent, grind maize and barley.

Two days exhausted the sights of Mestia, and on the third we shouldered our rucksacks to go and visit the family of Joseph, our local guide, in his house at Cholasy, 10 miles upstream. Here was a typical Svanetian village, a tight cluster of grey houses set into the hillside where the dark green of the firs served only to brighten the scarlet of the rhododendron groves, the yellow of the birches and the brown of the decaying bracken. Each house, square-built and of considerable size, had a verandah with an ornamented carved balustrade running round the second storey reached by an outside wooden staircase. Adjacent to each house was a medieval stone tower some 40 feet high which reminded me forcibly of the Italian town of S. Gimignano. Joseph was very proud to show us to the top of his. Entering by a low door, we mounted to the first floor by a rough wooden ladder, then pulled it up behind us and barred the trapdoor before going up to the next and further floors. There was a perilous gap between the top of the ladder and the fourth floor entrance but, once up, we found ourselves in a bare room with no windows, only slits in the walls through which weapons could be trained on to hostile invaders. These usually were not the enemy from a foreign land but the next-door neighbour out to avenge insult by murder. Here the family would gather with enough pro-

On the slopes of Elbrus

Descent into Svanetia: Mount Ushba in background

In a Svanetian home



In a Svanetian valley: Cholasy village

visions to sustain a siege of several weeks. Happily those times are past and the towers have lost their original purpose, but I noticed that the Svanetian still loves weapons and carries a gleaming knife at his side or a cartridge belt slung around his shoulders.

I had the opportunity of visiting several homes and found that the people in this valley live in communal family groups. We walked from Cholasy to Jabeschi where, as we arrived, an old woman left her work in the fields to take us into her home. Here we found assembled not only her children, married and unmarried, but her brothers, aged eighty-six and eighty-two, come together to welcome this stranger from another land. I noticed that the Svanetians are tall and spare with black hair, and merry eyes looking out from long, pointed faces. We had a feast of cold chicken which was divided into the requisite number of portions and eaten with the fingers, sour milk in a central bowl into which each dipped his spoon, and potatoes steamed in their jackets. Many were the toasts proposed and drunk in the home-brewed vodka and I was not allowed to leave without promising to send a letter from England with pictures of our country.

The following day a high green pass brought us to the upper Inguri itself and as darkness fell we paused at the first house in Iprari. With traditional Eastern hospitality the home was thrown open to us. We were shown into the common living room, 40 feet by 20, and invited to share the family supper of "hatchipoury" (flat loaves cooked with a filling of potatoes or cheese). When it came to bedtime, we were not allowed to use our camping things but were conducted up to the huge bedroom where six single beds were spread with white sheets and red hand-quilted covers. Once more, the people were delighted to see us and asked why more did not come for they would so like to have visitors. They seemed to have no idea that it was the political restrictions under which they lived that prevented communication between countries. Before we left the village, we mounted a 500-foot eminence to see the little square church whose age was lost in legend. Inside, a gilt cross reaching to the roof divided the apse from the remaining portion, perhaps 14 feet square. I put my hand into a recess and pulled out a handful of Tsarist coins and pages from an old Georgian book. No one seemed to know anything of these, of the history of the church or of the meaning of the paintings on its walls and the inscriptions on the cross.

The next day we walked to the head of the valley, arriving at Ushkuli (7200 feet), a commune of two little hamlets snuggling in the fold of high hills offset by the snowfields and glaciers of Shkhara. Here we climbed 500 feet to the summit of the hill on which is the castle of Tamara, the only woman ruler of Georgia, under whom the country attained its greatest fame and prosperity in the twelfth century. Her name is still honoured and her beauty legendary. We were told that many lovers had visited her in her castle and had been allowed to remain one night on the condition that in the morning they would be cast to death from the battlements. Apparently the enjoyment was deemed well worth the price, for many so perished.

Back in Iprari, we paid our respects to the head of the collective farm sitting in state in his little wooden shack. On his head he wore the typical tightly-fitting round white cap woven from goat's hair in the village. From what I could see, his responsibilities were not great and there was little indication of modernization of farming methods. In fact, I saw oxen drawing the wooden ploughs and corn being winnowed by hand. We took advantage of his offer of a lorry to Mestia and arrived back late at night.

Early the next morning we boarded the open-sided bus which was to take us to

Sukhumi and, travelling all day, we reached the Black Sea the same night. At this semi-tropical health resort, although it was now October 20, visitors were still bathing in the warm sea and exposing themselves to the hot sun on the sandy beaches. I rested here a few days after the exertions of the previous weeks and somewhat reluctantly left its sunshine for the grey skies of London.

There was a certain satisfaction in having penetrated into this remote, beautiful part of the Caucasus and in having re-established British contact with the Russian mountains after so many years, but even more pleasing was the recollection of the friendship and hospitality which I enjoyed throughout my trip from my generous Russian hosts. I am particularly grateful to Mr. Eugene Gippenreiter of the Mountaineering Section of the U.S.S.R. Sports Federation who was responsible for all the detailed organization and who acted as guide throughout the journey.

SETTLEMENT IN THE GLAMOČKO POLJE

H. J. SAVORY

IN THE SUMMER of 1955, I made a preliminary study of the human geography of certain parts of the karst of central Dalmatia and western Bosnia. The Glamočko Polje was selected as the subject of a more detailed enquiry when, in 1956, I returned to the area accompanied by D. J. Shaw, of Oxford University, and for the last two weeks of our stay by I. Baučić of Zagreb University. This paper is the result of work done in both years. I should like to thank the Council of the R.G.S. for contributing towards the expenses of the fieldwork. I am grateful to Mr. Baučić, especially for the benefit of his advice on the physical geography of the karst, and to Mr. Shaw who carried out a survey of house-types. All three of us collaborated in the village survey of Skucani and in most other aspects of the work, but both colleagues are absolved from the responsibility for any deficiencies in the interpretation of results presented here.

It would have been possible to select other areas where recent changes have been more active, but my aim in this instance was to study settlement in a mountain environment where the traditional mode of life changes slowly. The Glamočko Polje, remote and isolated, with the vestiges of a transhumant economy, is inhabited by people whose origins and religions have a complexity typical of Balkan conditions. It is as self-contained as a Swiss canton and is the chief inhabited area in the rural district or *srez* of Glamoč. Our field study did not cover the whole of the *srez* and we also omitted a northerly extension of the *polje* in the direction of the Unac river.

Methods of study were conditioned by local difficulties. Although the basis of our field work was the recording of land use and settlement, large-scale maps were unobtainable and our general maps were compiled by the use of field sketches and enlargements of 1: 50,000 maps. In addition, a simple survey was made of the village of Skucani. We attempted to elicit locally the information needed to illumine the maps. One of the difficulties of human geography is to make contact with people and to check what one learns about their mode of life against the observed features of the landscape. We talked to peasants and local administrators and I am grateful for the cooperation shown by them. We had some access to local agricultural records but full use of unpublished official sources was not permitted. From the information and observations collected I have tried to create a synthesis relating human conditions to the physical setting.[1] Broader regional syntheses derive their validity partly from detailed studies of small areas and I hope that this description may contribute to that end.

The western limestone or karst zone of Jugoslavia extends from Istria and the Julian Alps in the north-west to Montenegro in the south-east. Away from the coast, a large proportion of the inhabitants of this region occupies the discontinuous valleys known as *polja*. The *polja* are the largest of the depressions formed by karst erosion. Far from uniform in physical constitution, they have also been subjected to diverse modes of human occupation. Some of the largest *polja* are found among the Dinaric Alps in the hinterland of Split (Fig. 1). As one crosses the zone on the route from Split to Banja Luka the maize and vines of the coastal area give

way to hardier plants. At Glamoč, 65 miles from the sea, one reaches a height of 3000 feet. Barley is the most common crop and the sporadic green patches in the *polja* are no longer vines but potatoes. The surrounding uplands, though still barren, have a more profuse vegetation than the coastal zone and the eastern sides of the higher peaks, like Šator and Cincar, are dark with coniferous forest. Among these mountains, the Glamočko Polje is a deep narrow cleft, linked to distant neighbouring *polja* by a single daily bus, but living its normal life in isolation.

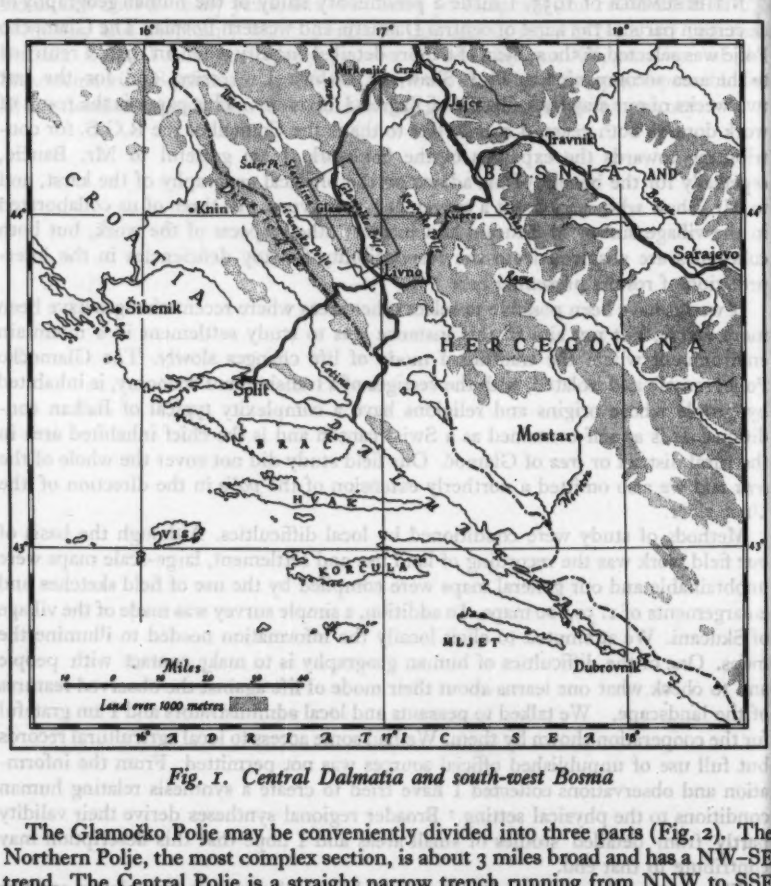


Fig. 1. Central Dalmatia and south-west Bosnia

The Glamočko Polje may be conveniently divided into three parts (Fig. 2). The Northern Polje, the most complex section, is about 3 miles broad and has a NW–SE trend. The Central Polje is a straight narrow trench running from NNW to SSE and is less than a mile wide in places. The Southern Polje, overshadowed by the 6000-foot peak of Cincar, has the form of an amphitheatre.

Physical influences [2]

The Glamočko Polje owes its physical constitution to three interdependent factors; faulting, impermeable Triassic outcrops, and Tertiary sediments (Fig. 3). The largest of the faults runs along the Central Polje and continues into the

Northern Polje as far as Mladeškovci. Minor faults run along and near the western edge of the Northern Polje. On the south-west side of the faults, the upthrow is considerable. The plateau to the north-east of the *polje* consists entirely of Cretaceous limestone. To the south-west are Triassic rocks, for the most part dolomite, but including a distinctive area of Werfen shales and sandstones immediately south of Glamoč. The outcrop of Werfen beds differs from the rest of the area in having a perennial surface-drainage and normal valleys. Weathering of Triassic rocks, especially of the shales, has provided some of the impermeable floor deposits which have been instrumental in extending the *polje* by aiding the solution of limestone along fault zones. The Tertiary deposits, mainly Pliocene lacustrine marls, were originally more extensive than the present *polje* and have been preserved by down-faulting. They have also been deformed by subsequent warping. Where they form hills, such as Homar and Hapin Brijeg, they are reminiscent of English downland. No Pliocene deposits are visible in the southern half of the *polje* south of Skucani, and there are none in the north-western sector, where they are succeeded by low shelves of dolomite (Fig. 4).

Since the Late Tertiary uplift and faulting, the relief has been moulded by corrosion of the limestone on the one hand, and by differential erosion of impermeable formations on the other. Material from the latter was transported to lower levels and then underground through swallow-holes (*ponori*); whenever these became blocked, the sediments accumulated in depressions at the surface. Solution of the limestone was most active along the margins of the sedimentary plains, especially where poor drainage caused acidity, and hence lateral extension of the *polja* by solution took place. Changes in the balance between accumulation and removal of sediments have caused fluctuation in the level of deposition and solution, and the karst terraces (*zaravni*) are a consequence of this process. These are low limestone shelves, uniform in level but pitted with solution-hollows (*vrtace*); such terraces are extensive in the Northern Polje and their human significance will be stressed later.[3]

Changes in climate have considerably affected karst processes. The results of the Pleistocene period are very evident. Cirques and moraines occur on Šator and Cincar. Powerful erosion brought coarse gravels into the *polje*. These are now embedded as conglomerates beneath much of the Central and Southern Polje, where they are visible in large swallow-holes. Coarse gravels of similar age appear in some parts of the Northern Polje. The surface deposits on the floor of the *polje* consist mainly of humus and *terra rossa* washed off the limestone surface since deforestation.

The two largest streams, the Medved[4] and the Busija, both flow from valleys deeply incised in the Triassic rocks; both cross the Glamočko Polje and disappear in swallow-holes on the opposite side, the Medved near Hasanbegovići and the Busija near Skucani. As the first continues underground to the Unac river, and the second reaches the Cetina, the watershed between them is the divide between Danubian and Mediterranean drainage. On the floor of the *polje* this divide is no more than a few feet high and, in winter, flood water flows from one basin to the other. A few small streams rise in springs on the edge of the *polje*. The largest of these is the Vrba which rises near Han Vrba and, flows through the middle of the Central Polje eventually to disappear in a swallow-hole below Korično. There is no regular stream in the Southern Polje, but after rains and melting snows a large volume of water springs from the eastern side and flows into several big swallow-holes on the western side. Most of the water comes from the Kupreško Polje 12 miles to the east and flows to the vauclusian source of the Bistrica at Livno. The swallow-holes

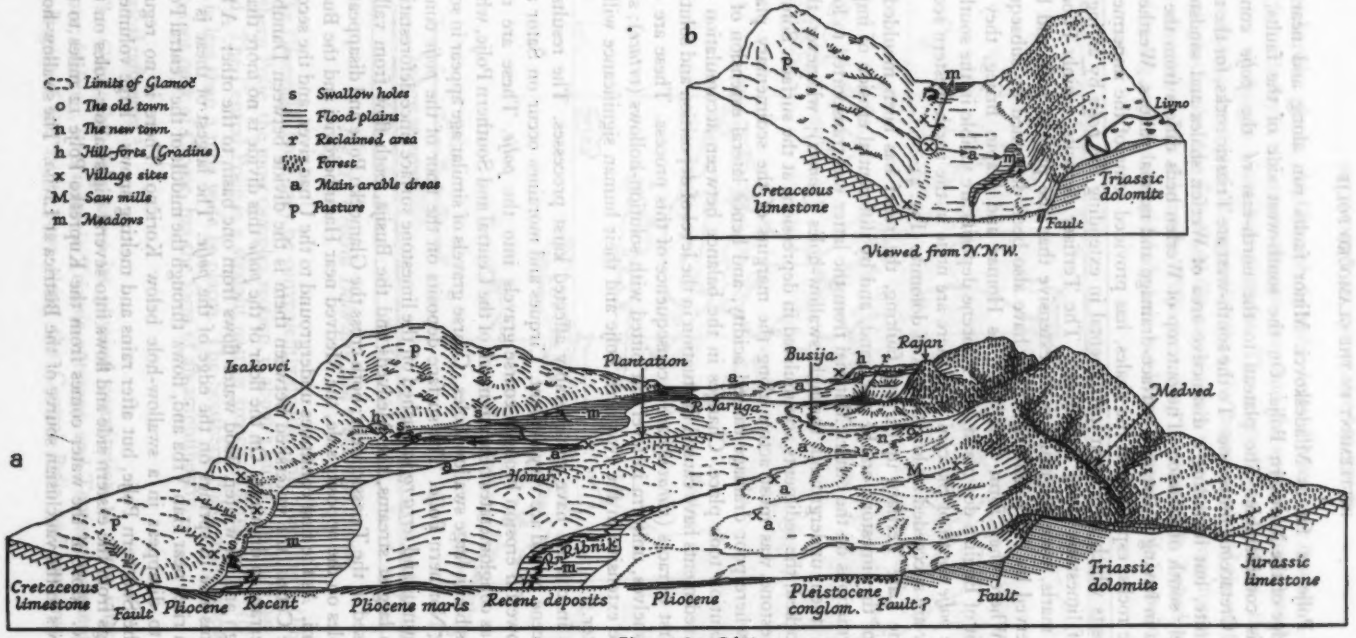


Fig. 4. a. *Block diagram of part of Northern Polje.* b. *Block diagram of part of Central Polje*

fail to cope with the flow in winter and most of the Southern Polje then becomes a lake between 10 and 20 feet deep. The lake freezes over in January. (The belt of Triassic rocks on the south-west side of the main fault must impede the flow of underground water westward and divert it towards Livno.) Floods cover from one-fifth to two-fifths of the floor of the *polje*, especially in early winter and late spring. The floods continue into May and sometimes into June; villages become isolated and some, such as Skucani, are accessible on horseback only.

Historical antecedents

Many sites show traces of early occupation, but hardly any have been systematically examined. Most prominent are the *gradine* or hill forts which occupy spurs above some of the present-day villages (Fig. 5): these were almost certainly on sites already occupied before the Romans arrived, but finds of pottery indicate that they were still inhabited in the sixth century A.D. or later.[5] Stones from Roman settlements were quarried for their later construction. In Roman times the Glamočko Polje lay on the route from Salona[6] to Servitium, near Brod on the Sava.[7] The main Roman road crosses Staretina from the Livanjsko Polje to Halapić. Thence to Modena Selište it crosses open fields and the peasants know it as "Maria Theresa's Road"; from Modena to Odžak it coincides with the modern highway. Two other routes crossed the mountains from Livno and then followed the western side of the *polje*, missing Glamoč which was not an important settlement in Roman times. Milestones and wheel ruts have been found on all these routes. The two chief Roman settlements were at Halapić and Podgradina. The first has numerous remains near the site of a *crkvina* or ancient church, and this may have been the *municipium* of Salvium. On a Pliocene terrace near Podgradina is the site of Borak, close to the Serbian-Orthodox church of St. Peter—an early dedication often indicative of early settlement. Frequent inscriptions to Silvanus at both sites denote the character of the surrounding country.[8]

Little is known of subsequent occupation by the Slavs except that hill villages on the edge of the *polje* were reoccupied. In the tenth century, Constantine VII assigned this area to baptised Croatia,[9] but the Bogomil heresy[10] had influence there and in 1357 Glamoč became part of Bosnia. When the region came under Turkish rule, the Bogomil feudal lords were converted to Islam; most of the Mohammedans were indigenous. The present concentration of Mohammedans in and near Glamoč is partly due to movements after the departure of the Turks, but many Mohammedans are also found in very old centres of settlement like Halapić, Jakir and Isakovci (Fig. 8). Opinions differ on the extent to which the Turks supplanted the previous agrarian regime and imposed their own feudal institutions with roots in Anatolia.[11]

Under Turkish rule the serfs (*kmetovi* or *rayas*) paid one-fifth to one-third of their produce in kind to the *Begs*, and taxation and insecurity of tenure laid an intolerable burden on the peasants. The Austrian occupation and later annexation of Bosnia led to the introduction of safeguards on behalf of the Christian serfs, but did not radically change the system. The Austrian census returns from 1885 to 1910 (Fig. 8) show that most of the free peasants were still in Mohammedan villages and most of the serfs in Serbian-Orthodox villages.[12] Different degrees of serfdom were recorded, which accounts for some villages not having a simple majority of one or the other. The position was complicated by the return of Catholics whose forbears had fled from the Turks to Croatia many generations earlier, and by the purchase of land from Turks who emigrated. The freer purchase

of land led to more scattered ownership of strips, and the land reform instituted after 1918 did not seriously limit inequalities in ownership. After 1945 wholesale redistribution and collectivization were attempted, but later abandoned because of peasant resistance. The peasant ownership of strips remains individual and unconsolidated and the ancient pattern of land occupation survives under a socialist economy, but in a more equalitarian fashion than before.

Agrarian structure

Most of the arable land in the Glamočko Polje is divided into parcels privately owned by peasants. The parcels are nearly all long, narrow strips approximating in area to multiples or fractions of the *dunum*, and are ploughed by teams of oxen.[13] By an agrarian law of 1952, the total area of land held by any one peasant must not exceed 25 acres. Within this limit, exchange and sale of land are possible, and there has been some recent consolidation of holdings. Although most of a peasant's strips are scattered about the land of his own village, he may possess strips in any part of the Glamočko Polje. A fairly representative holding in Skucani (Fig. 10) comprised eight parcels of land, including meadow, of which three were in the neighbouring village of Jakir. One of the largest former landowners now has between fifteen and twenty parcels in Skucani. He also formerly held some in Jakir but disposed of them, as his holding exceeded the maximum. Land confiscated from the larger holdings after 1945 was usually the most remote from the village so that the amount of travel to distant parcels has declined. Confiscated land has been absorbed into funds administered by the villages or by the larger enterprises such as the one known as Dobra Hrblijna.[14]

There are no communal rotations of crops. Each peasant manages a rotation on his own strips and this is often not very systematic. Usually, two years of grain are followed by two or three years of fallow. Potatoes, introduced into the area about 1870, are a common crop grown on fairly large plots around the homesteads and on parts of strips to clean land which has been fallow. As the potato crop is not lifted until after the stock have been turned onto the stubble, the plots are often protected by a movable fence of wicker and stakes. In Dalmatia stock are grazed on the stubble of individual strips only, but here they are allowed to graze anywhere within the *polje* once the cereal crops have been harvested. Some of the land parcels are permanently allocated to hay and pasture. Those on lowland meadows or flood plains are more variable in shape than the arable strips and are marked by stones or stakes. Some hay meadows are on shelves above the *polje* and some are small fenced plots in *doline*. The mountain pastures are free and there are no communal systems, such as stock ratios, to limit their use. The upland pastures are poor but extensive in area and have supported greater numbers of stock in the past than they now carry. The villages possess traditional grazing lands, but there has been a post-war tendency to concentrate stock nearer to the villages and to abandon the high and distant pastures, many of which have been taken over by the Dobra Hrbljina. An interesting survival of the earlier agrarian system is the tithe still paid in kind to the owners of mills.

Climate and the agrarian routine

The duration of snow on the mountains, and floods lasting five months on part of the floor of the *polje*, have enforced transhumant movements of stock, part of a traditional seasonal regime pursued until the Second World War (Fig. 6). Hard winters, combined with fairly plentiful pastures on the karst uplands compared

with those in the dry zone of Dalmatia, made stock-raising predominant in the area, and transhumance was designed to obtain maximum fodder for stock at all seasons. In summer, under the old system, most of the stock were kept in the mountains, so that hay could be collected from meadows on the flood plain and stored for winter feeding. On St. George's Day the stock were driven onto the mountains and as the season progressed they moved up to higher levels to graze

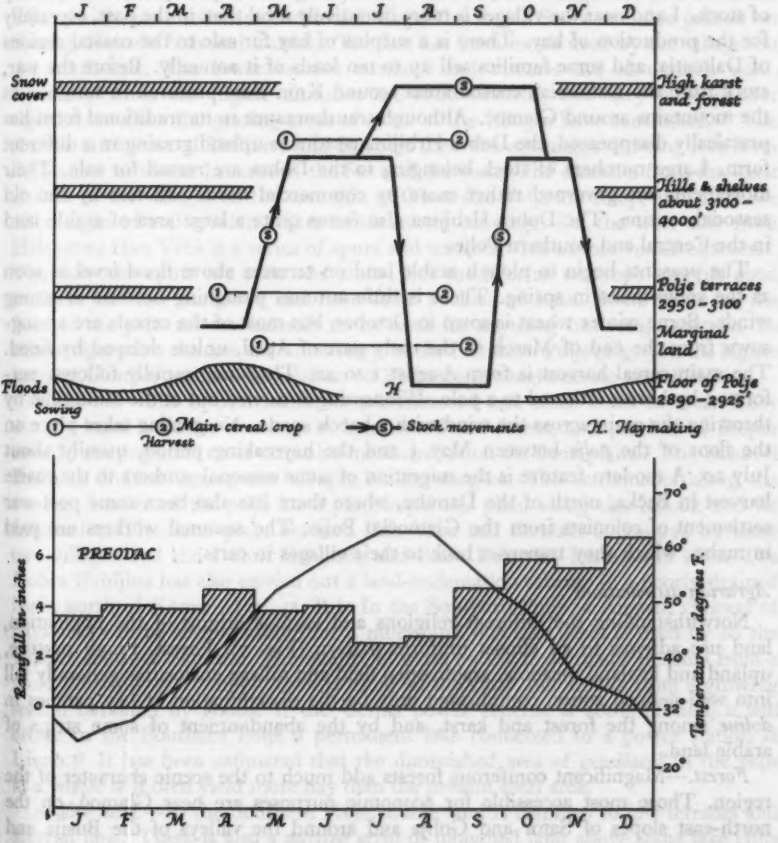


Fig. 6. Climate and the seasonal routine

on pastures exposed after the snow had melted. Many of them remained on the mountains throughout the summer, but some were brought down to graze on the meadows after the haymaking and on stubble after the harvest. Although the majority of the stock returned to the *polje* in November, owners of large numbers kept them on sheltered parts of the upland throughout the winter. In the mountains were many seasonal and some permanent dwellings in which women (*stopanice*) made cheese by methods similar to those employed in the Alps.[15] Transhumance seems to have reached its zenith about the end of the Turkish occupation, when

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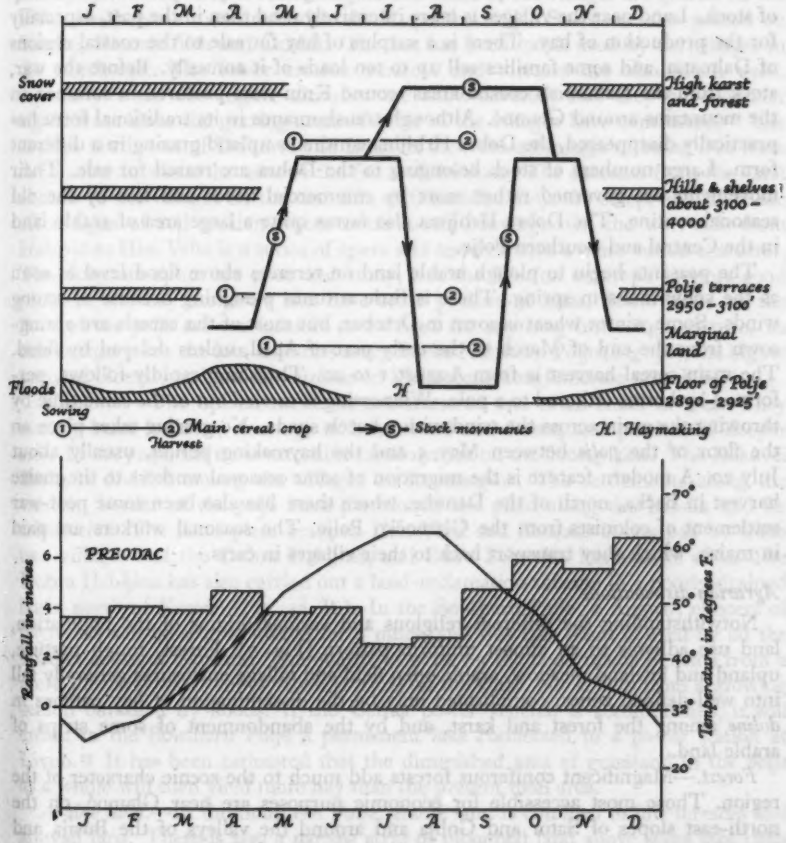

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this mode of life was very likely the best defence against the tax-gatherer. In those days the whole family went to the mountains in summer, except the old people who were left in the village to guard it against fire. Since that time the numbers of stock have declined. The latest blow fell during the last war, when many stock were killed and mountain dwellings destroyed. The numbers of stock have risen since 1948, but transhumance has not resumed its earlier form. The villages now use a more restricted area of pasture and there is greater equality in the ownership of stock. Land near the villages is more intensively used than in the past, especially for the production of hay. There is a surplus of hay for sale to the coastal regions of Dalmatia, and some families sell up to ten loads of it annually. Before the war, stock from the Dalmatian coastal areas around Knin were pastured in summer on the mountains around Glamoč. Although transhumance in its traditional form has practically disappeared, the Dobra Hrbljina continues upland grazing in a different form. Large numbers of stock belonging to the Dobra are reared for sale. Their movements are governed rather more by commercial needs and less by the old seasonal routine. The Dobra Hrbljina also farms quite a large area of arable land in the Central and Southern Polje.

The peasants begin to plough arable land on terraces above flood level as soon as the snow melts in spring. There is little autumn ploughing because of strong winds. Some winter wheat is sown in October, but most of the cereals are spring-sown from the end of March to the early part of April, unless delayed by flood. The main cereal harvest is from August 1 to 20. Threshing rapidly follows, performed by horses tethered to a pole. Winnowing is carried out at the same time by throwing the grain across the wind with a beech spade. No grazing takes place on the floor of the *polje* between May 5 and the haymaking period, usually about July 20. A modern feature is the migration of some seasonal workers to the maize harvest in Bačka, north of the Danube, where there has also been some post-war settlement of colonists from the Glamočko Polje. The seasonal workers are paid in maize, which they transport back to their villages in carts.

Agrarian distributions

Notwithstanding the different religions and various origins of the population, land use adheres to an almost uniform pattern (Fig. 7). Forest, rough pasture, upland and lowland meadow, arable open field and village enclosures generally fall into well-defined zones, complicated only by the dissemination of hay patches in *doline* among the forest and karst, and by the abandonment of some strips of arable land.

Forest.—Magnificent coniferous forests add much to the scenic character of the region. Those most accessible for economic purposes are near Glamoč, on the north-east slopes of Šator and Golija and around the valleys of the Busija and Medved. At lower levels, deciduous woods succeed the coniferous and cover the western margins of the Central and Southern Polje. There is no forest on the eastern margin, only brushwood in the moister valleys and *doline*. Coniferous forest reappears on the east sides of Cincar and Slovinj. In the Korično saddle area, hazel and dwarf oak have replaced the former forest. Exploitation of the forest is in the hands of a special administration and the timber is sawn at the Asići mills near Glamoč. The small area of forest in private hands is mostly brushwood and deciduous. Timber is one of the main commercial exports of the area. The villages also have controlled cutting rights and consume much timber for fuel and house construction. Conservation is now evident, and a coniferous plantation

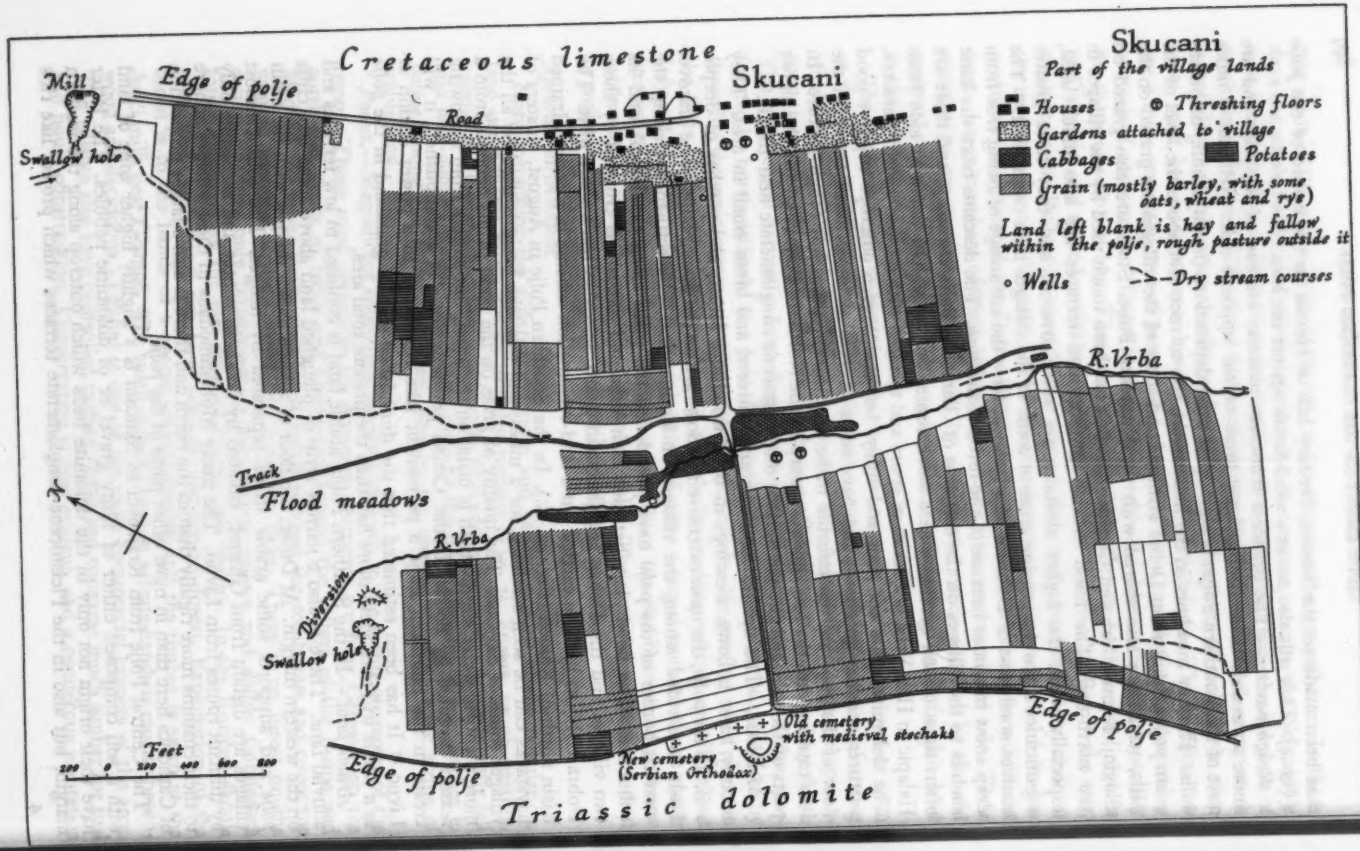
has been made on the barren Tertiary hill of Homar in the centre of the *polje* (Fig. 4). This will also act as a wind-break against the *bora*.

Rough pasture.—The broadest mountain pastures are east of the *polje* and are more accessible than the restricted areas on the opposite side. Hrbljina, 6 miles east of the Southern Polje, is a group of karst depressions (*uvala*) among turbulent hills. The hay meadows in the hollows are 600 to 1000 feet above the level of the main *polje*. Stock from Dobra Hrbljina and some of the villages are grazed on the hills, which are also shared with the Kupreško Polje. Stock are also grazed on Slovinj, Kamzin Vrh and Čardak. The last has been much used by the villages in the north-east. The lower erosion surfaces and terraces are also much used, especially when the higher altitudes are snow-covered, and they have greater significance since the grazing areas of some of the villages have contracted.[16] The shelves north-east of Dubrave and Isakovci have the advantage of being free from deep snow in winter because of the force of the *bora*. The descents from the karst shelves to the villages on the east side of Glamočko Polje are steep, and there are often signs of soil erosion where stock routes converge. On the west side from Halapić to Han Vrba is a series of spurs and terraces with a more varied character. The dolomite spurs are poor and stony, but the Werfen outcrops support good pastures and hay meadows and have some pockets of loess. Some tracts on the floor of the *polje* are too infertile to be used for anything but rough pasture. In this category are the low dolomite scarp in the Northern Polje (Fig. 3d), the higher parts of Homar, and the flat surface on Pleistocene conglomerate near Biličić.

Meadows.—The upland meadows are scattered and often small in area. They occupy karst hollows, clearings in brushwood and forest, and patches of deeper soil. In the *polje*, the most extensive meadows are on the flood plains. The Isakovci Basin is divided among the villages on its margins. The settlements along the western border of the *polje* have partitioned the plain along the Ribnik and its tributaries. The flood plain between Han Vrba and Skucani is cropped by these two villages and the Dobra Hrbljina, and Staro Selo also has a share of it. The Dobra Hrbljina has also carried out a land-reclamation scheme in a poorly-drained basin north of Kamen (Fig. 4a, R.). In the Southern Polje in August, clusters of haystacks can be seen scattered for 2 miles, and this lake basin is used by all the villages south of Skucani. The quality of grass on the flood plains benefits from a more plentiful water supply than is usual on the karst, but suffers from a growing season curtailed by floods. If the Cetina power scheme is accomplished, it will create in the Southern Polje a permanent lake connected to a power station at Livno.[17] It has been estimated that the diminished area of grassland in the *polje* as a whole will then yield more hay than the present total area.

Arable land.—In the Southern Polje, arable land is confined to low terraces and alluvial fans. There is also a narrow strip of ploughed land above some lake cliffs on the western margin. At Dolac, the floor of a large *dolina* merges with the main *polje* and supports some arable strips separated by hedges. The southernmost villages are distant from Glamoč, isolated by floods in winter and accessible only by difficult routes from Livno. The many Mohammedans in these villages adhere to their customs more rigidly than in the north and there is also a larger proportion of Catholics here than in most other parts of the *polje*.

The Central Polje from Krajzovci to Skucani is a slightly higher zone of land with a soil composed either of flinty gravel or of dolomitic pebbles. The latter have their origin not only in the dolomite beds which outcrop along the western margin, but also in the Pleistocene-conglomerate terraces which project like ribs


Cretaceous limestone
Skucani
Mill
Edge of polje
Road
Swallow hole
Skucani
Part of the village lands
Houses
Threshing floors
Gardens attached to village
Cabbages
Potatoes
Grain (mostly barley, with some oats, wheat and rye)
Land left blank is hay and fallow within the polje, rough pasture outside it
Wells
Dry stream courses
R. Vrba
Track
Flood meadows
R. Vrba
Diversion
Swallow hole
Old cemetery with medieval stechaks
Edge of polje
Feet
200 0 200 400 600 800
Edge of polje
New cemetery (Serbian Orthodox)
Triassic dolomite

into the *polje* at Vidimlje and Krajzovci. These soils are not naturally very fertile, but they are comparatively well manured because a small area of arable land occurs alongside a large area of accessible mountain pasture supporting large herds of stock. For the most part, the pattern of land use consists of a belt of irrigated cabbage and potato patches along the Jaruga stream, a zone of fairly intensive cultivation below the villages on the east side and of less fully used land on the west side (Fig. 10). Cultivation strips run across the *polje*. Some broader rectangles of meadow result from the consolidation of confiscated property, the hay from which contributes to the funds of the local authority. Between Han Vrba and Jakir, the best land, indeed some of the most fertile in the whole *polje*, lies on Pliocene terraces along the western margin.

To this general account of the Central Polje I add a more detailed description of Skucani (Fig. 10). The village, the inhabitants of which profess the Serbian-Orthodox religion, is strung out along the north-eastern edge of the *polje*. At the north-west end the meadows are flooded in winter. Eastwards, this poorly drained land is constricted into a funnel and then a narrow strip following the Vrba stream through the centre of the *polje*. The arable tracts lie on gently sloping land on both sides. Their soil is poor and gravelly. A typical rotation on a single strip is 1 barley, 1 wheat or barley, 1 rye or oats, 1 to 3 fallow, 1 potatoes. Cabbages and some hops are grown on enclosed patches of moist or irrigable land in the centre of the *polje*. Most of the gardens below the village are planted with cabbage and potatoes. There are also a few well fertilized plots of flax. The crop is retted in the stream and, with wool, is made into cloth in the village. We were told that the average villager has 25 to 30 sheep and 4 or 5 cattle, the first figure being above the average for the *polje*. The village has abandoned the pre-war summer pastures at Hrbljina and uses the less distant slopes of Slovinj. In winter livestock is kept in outhouses or in the ground-floors of the dwellings. Most of the houses are half stone and half timber, but a few are Dalmatian in type. Some of the water supply is run off the roofs into cisterns after filtering through gravel. The main supply comes from wells.

The distribution of land in the Northern Polje has a complex connection with physical and social conditions. Within a range of altitude of 300 feet, the lowest levels are too wet for cultivation and the highest levels on Homar are too dry. The gravel plain and dolomite shelf north of Čoslije are also uncultivated. The best land is on the lower slopes of the hills, as at Petrovo Vrelo, or in depressions where soil has accumulated, such as the dry valley between Modena and Branješci. As there is not enough stock to manure the whole of the Northern Polje, concentration on the best and most accessible fields accentuates the contrast in the quality of the land and results in a pattern similar to that of an "infield-outfield" region.

Villages and urban settlement.

The majority of villages have a marginal situation and a linear form. Among the several causes which contribute to this are water supply, access to pastures, avoidance of floods, shelter from the *bora*, historical descent from the *gradina* sites, avoidance of good arable land and the need for a rock foundation in an area with an unstable subsoil. Most villages get their drinking water from wells sunk in gravel fans or terraces, or from cisterns inside the dwellings. Water is often carried for some distance on horseback and some wells are used by more than one village. Although subterranean water is more easily accessible than in the Dalmatian karst because of the higher water-table, it is also more unhealthy,

particularly in the centre of the *polje*. Some villages, especially on the north-western margin, are supplied by perennial springs and by streams which flow off the impermeable formations. The pastures used by the villages in the Central and Southern Polje are nearly all on the east side and this is a significant factor in the siting of villages like Skucani and Vidimlje, since stock routes lead directly from them to the uplands without crossing the arable land. From villages like Biličić and Kovačevci, in the centre of the Northern Polje, this is impossible and some villages on the western side, like Šumnjaci, pasture their flocks on the opposite side of the *polje*.

Practically all habitations are concentrated in the villages. Each village is really a collection of farms, strung out along a road or track, rather like an encampment. For the past hundred years over 90 per cent. and often 100 per cent. of the working people of the villages have been engaged in agriculture. In some villages, a school or a *Zadruga* (*i.e.* a Co-operative, which is often also a social centre) constitute the only buildings not connected directly with agriculture. Timber is the chief building material in the Northern Polje and stone in the Southern Polje (Fig. 9).[18] The most typical house in the Northern Polje is Cvijić's *brvnara*. It has a timber frame and a high-pitched shingle roof into which smoke disperses from a central hearth (Fig. 9, No. 1). This simple construction is often modified by additions and by a fall in the inclination of the roof near the edges, possibly to deal with snowfall (No. 2). This type is more common on the western than on the eastern side of the *polje*. Alpine influence has produced a still more complex roof and sometimes a balcony (No. 3), and this is most common in the Northern Polje. Dwellings with a ground-floor of masonry, used as a stables, and an upper floor of timber, are common in the Central Polje (No. 4). The houses of the Southern Polje are mostly built of stone in the Dalmatian style (No. 6). The Eastern-Turkish type of Cvijić is rare and there appears to be no marked connection here between religions and house-types. Following the widespread destruction of villages between 1941 and 1945, many houses have been rebuilt in stone and tile. Only nine houses are said to have survived the war in the town of Glamoč. It has been rebuilt largely of stone and it also contains some attractive architecture inspired by the traditional style in stone and timber.

Glamoč is not a settlement of great antiquity. The old town was on a dolomite spur, now dominated by the ruins of a Turkish castle and mosque. In the last century a new town developed near the main road at the foot of the spur. Most of the shops and administrative buildings are around a small triangular park. The urban functions of Glamoč, although only on a minor scale, cause its appearance to contrast sharply with that of the villages. There are two hotels, a bank, a book-shop, and a new secondary school which is a credit to a community of this size. There are two Saturday markets: a grain market near the centre of the town, and a stock market on its north-eastern fringe. Sheep and cattle bought in the latter are transported by lorry to Dalmatia; a fair is also held annually in September.

Although 86 per cent. of the male population are engaged in agriculture and stockraising, the *srez* of Glamoč fails to subsist on the food it produces and some hundreds of tons of grain have to be imported into the area annually. A defect of peasant agriculture is fluctuating yield, usually ranging from five to ten times the amount sown. In the absence of imported fertilizers, the quality of the land can only be improved by better organized use of manure. Transhumance involving stock moving widely over the uplands has never contributed much to this end.

The extent of arable land in the *srez* is only 28·5 out of 420·7 square miles and most of this is used to grow food crops, of which barley and potatoes together amount to more than all others. There is very little land under fodder crops other than hay. Stock live mainly on hay and pasture and an improvement of both is vital for the development of better breeds. Reclamation of the poorer tracts of arable land could provide a greater area for the production of fodder crops. Much of the land is suited to mechanization but there is no immediate prospect of capital or equipment for large-scale schemes. There are also social obstacles to such plans, and the limitations set by the government on the accumulation of land preclude private capitalist development. On the other hand, the present administration has decided against any further attempt to collectivize agriculture against the will of the peasants. The area is therefore committed for some years to small holdings of land. An equal division of land among all males from twenty to sixty years of age engaged in agriculture would give each about 70 acres of land of any use, including 7·6 acres of arable land. Computation from our own maps shows the average area per household to be about 8 acres of arable land and just under 8 acres of meadow land on or near the *polje*. Under these circumstances there are only two prospects of concerted improvement. The first is State assistance through Co-operative organizations for which this area has little priority. The second is improvement of individual standards and strengthening of Co-operative organizations through the impact of industrial and urban development. This is already happening near Split, but the Glamočko Polje is far removed from the new industrial centres.

Most of the difficulties of the region have their roots in geography and history—the karst, the heritage of Turkish feudalism, and past strife between religious communities. On the face of things there are few areas in Europe where either prosperity or cooperation would seem to be more difficult to achieve. Nevertheless one may see in its human geography a natural unity which overrides religious and other differences in the community, and which may be transformed but not effaced by future technical development.

APPENDIX

Statistical Summary.

(*a*) *Srez* or Rural District of Glamoč	*square miles*
Total area	420·7
Agriculturally useful land	261·7
Total cultivated area (incl. temporary fallow)	28·5
Privately held cultivated land	22·5
Meadows	99·5
Privately held meadows	84·1
Total rough pasture	133·7
	number
Population (1948)	15,141
Number of households	2,655
Total number of households dependent on agriculture and stock-raising (1951)	2,546
Number of households employed in *zadruga* (c-ooperatives and state-farms)	292
Total number of cattle	8,525
„ „ sheep	26,032
„ „ horses	2,870

(*b*) Glamočko Polje	*square miles*
Total area	50·2
Maximum flood area	20
Area of arable land per household (in area covered by field study)	8·18
Area of arable land per household in	*acres*
Northern Polje	9·33
Central Polje	5·96
Southern Polje	5·43

(Sources: F.N.R.J., Federal Statistical Office, Population Census of 1948, Belgrade; F.N.R.J., Zemljoradničke Zadruge 1952, Statistical Bulletin No. 23, Belgrade, 1953; Land-use map (Fig. 7); F.N.R.J., Livestock Census of 1951, Belgrade, 1955.)

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[3] This terrace is especially marked near Branješci and Hasanbegovići (Fig. 3t), where it provides low-level pastures near to the villages, with small patches of hay and potatoes in the *doline*.

[4] Trans., "the Bear river"; bears still come down to water in this stream quite near to Glamoč.

[5] Sergejevski, D., "Putne Bilješke iz Glamoča." *Glas. zem. Mus. Bosn. Herc.*, 54 (1942).

[6] Solin, near Split.

[7] Ballif, P., 'Römische Strassen in Bosnien und der Hercegovina.' Vienna, 1893, p. 17.

[8] Sergejevski, D., "Rimski Kameni Spomenici sa Glamočkog Polja." *Glas. zem. Mus. Bosn. Herc.* 39 (1927), pp. 255–69.

[9] Constantine Porphyrogenitus, 'De Administrando Imperio,' ed. Gy. Moravcsik; trans. R. J. H. Jenkins, Budapest, 1949, 31/70.

[10] A dualistic heresy the supporters of which contracted out of the medieval religious struggle between East and West.

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[12] (*a*) 'Ortschafts- und Bevölkerungs-statistik von Bosnien und der Hercegovina nach dem Volkzählungs Ergebnisse von 1 Mai 1885.' Sarajevo, 1886.

(*b*) 'Hauptresultate der Volkzählung in Bosnien und der Hercegovina 22 April 1895.' Sarajevo, 1896.

(*c*) 'Bosznia és Hercegovina, Népszámlálása, 1910 Evi Oktober, Országos Kormány Statisztikai Osztalya.' Sarajevo, 1912.

[13] *Dunum*: a Bosnian measure 10 m × 100 m.

[14] "State Farm" is not a very satisfactory description of this organization, since Jugoslav socialist institutions are distinctive and cannot be thought of purely in terms of Russian conditions. The *dobra* employs hired labour and is not a Co-operative. It is publicly owned and is managed by an agronomist.

[15] A product known as "Greek cheese" was made. This is now manufactured at the Dobra Hrbljina, which is trying to develop its export.

[16] There is an extensive shelf at 3000 feet, north of Glavice. Terraces at 3050 feet, pitted with *doline*, occur near Branješci and Hasanbegovići and have been referred to in a previous footnote. East of the *polje*, dissected by dry valleys and *doline* there are further steps at 3800 feet and 4400 feet.

[17] Baučić, I., "Plan elektroenergetskog sistema Cetine." *Geograski Glasnik* (Bulletin de Géographie), Zagreb, **15** (1953), pp. 196–8.

[18] For this section I am indebted to Mr. D. J. Shaw, B.A., who carried out a survey of house-types. Figure 9 is also based on his work.

VILLAGE COMMUNITIES IN THE TAMBUNAN AREA OF BRITISH NORTH BORNEO

D. P. J. WOOD AND B. J. MOSER

THIS ACCOUNT OF the village communities on the Tambunan Plain in British North Borneo and of some of the less flourishing villages in the surrounding hills is mainly based on observations made during the Long Vacation of 1956 when we were part of the Cambridge North Borneo Expedition. The other members of the expedition, Peter Bryant (leader), John Boys (ornithologist) and Jack Woodall (zoologist and photographer) studied and collected high altitude tropical fauna on Mount Trus Madi (height 8600 feet) which lies 20 miles south-east of Tambunan.

The Tambunan Plain, with an average height of 1800 feet, is about 30 miles from the west coast of North Borneo, but a quick and direct communication between coast and plain is difficult because of the intervening Crocker Range. The plain is about 12 miles long with a width varying from ½ to 3 miles, and surrounding it are highly folded sandstones and shale hills, believed to be of Eocene age, which are covered with primary and secondary jungle. The origin of the plain is still obscure; it may be a graben once occupied by a lake. Certainly the plain consists of Quaternary deposits with much recent fluviatile alluvium. Sandy loams are the predominant soils, there are some clay loams, and in some parts podzols, leached white sands, are found that are useless for agriculture. Bracken, Straits rhododendron and tagai (*Baekia frutescens*) are the characteristic flora of this scrub vegetation. The white and infertile soil is called *kapayan* in the Dusun language and two villages on the fringes of the most extensive area of podzols are named after it—Kapayan Lama and Kapayan Baru. Leaching would probably be as bad as it is on the west coast itself except that the rainfall is less heavy. At Tambunan it is about 78 inches yearly.

Most of the plain is fertile, however, and it can be irrigated for wet rice cultivation without much difficulty. Rivers and streams flow from the surrounding hills into the Pegalan which meanders along the eastern edge of the plain. The chief of these tributaries are the Kairngaran, Sinsuran and Mawa. There are also numerous smaller streams and brooks which cross the eastward dipping plain from the Crocker Range into the Pegalan. No boats are to be seen on these rivers, for they are too rocky and normally too shallow for trade, or transport, or logging. The exploitation of the fine stands of timber in the hills to the east would be arduous because of this.

The main communications of the plain with the outside world have been by the bridle path which runs northward from Keningau, the headquarters of the Interior Residency, through Tambunan to Ranau, 35 miles farther north. From Keningau and its air-strip there is a Jeep road to the railhead at Melalap. In 1953 the bridle path, which serves as a humble equivalent of the Grand Trunk Road in nineteenth century India, was widened and improved into a Jeep road. This has speeded up access to Tambunan, although this dirt road is impassable when the rivers along its route are swollen and turbulent. The road peters out into the bridle path at the northern extremity of the plain at Mangi Pangi. Since the building of the Jeep road, a jungle track of an unknown age leading from Sinsuran at the north-east edge of the plain across the Crocker Range to the coastal plain of Penampang has declined in importance. It was formerly the quickest outlet and was used for bringing in such stores as hardware and salt. Apart from this there are a few jungle paths to hill villages, but their only economic significance is in bringing Hill Dusuns and their produce to the market at Tambunan.

The Dusuns are the most numerous indigenous people of North Borneo (population 118,000 according to the 1951 census) and on the Tambunan Plain live approxi-

mately 4500 of them. In 1956 there seemed to be about 450 more females than males. This is not only because there are more girl babies than boys but also because some men seek work elsewhere. The Dusun people are divided into several septs or clans and four of these are represented on the plain—the Tambunan, the Tagu, the Bundu and a few Liwan. In earlier head-hunting days these differences mattered, but in these less stirring times they signify little. Although villages tend to be predominantly inhabited by one of these groups, people marry outside their villages and clans without any sense of tension. The plain is comfortably full, yet owing to the general fertility of its soils and the present simplicity of the needs of its inhabitants, no one starves. As far as we could determine, only eleven families have migrated in the last few years to the larger Keningau Plain, where the government is encouraging Hill Dusuns to settle, or to the rubber estates of Tenom or Melalap and other places. On the other hand there is a steady trickle of young men to join the government service. The majority join the police force, for Tambunan is its most enthusiastic recruiting ground; a few become forest guards or medical dressers. Most of these wanderers return sooner or later to their village where they are treated with much respect by the stay-at-homes. In the slack periods of the rice cultivation cycle an increasing number of people go temporarily to European or Chinese rubber estates to earn some ready money.

On the plain intestinal disorders are common and there is tuberculosis, pneumonia and malaria. Energetic steps are being taken to curb the eight or nine types of anopheles that are found there. Tambunan is one of the pilot areas in a scheme for the control of malaria which began in 1955 with assistance from the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF). Yaws has been virtually wiped out but there is an increasing incidence of chicken-pox and measles among children. Their recovery is often jeopardized by the Dusun habit of giving cold baths to feverish infants. Among all age groups tetanus is an ever present danger. A medical dresser equipped with the latest drugs from the West is kept busy in his dispensary in the government station at Tambunan but some of the old people still put their trust in ancient charms.

In Tambunan itself live about 175 Chinese, speaking the Hakka dialect, as well as Malay, the lingua franca of Borneo. They are the most resourceful inhabitants of the plain. Their concern is commerce and they own twelve shops. The Land-Rovers which run daily to and from Keningau, when conditions are good, are controlled by them. It is significant that the only Dusun-owned shop looked unkempt and poor beside its rivals. Although most Dusuns pound their rice at home, there are two small rice mills, one in Tambunan and one in the large village of Toboh (65 huts) in the middle of the plain. The Tambunan mill is controlled by two Dusuns, one Sino-Dusun and a Chinese. The same Chinese businessman is in partnership with a compatriot and 3 Dusuns in the Toboh enterprise. It seemed to us the initiative came from the Chinese side in these undertakings.

On Sunday morning, however, the Dusuns come into their own in Tambunan when the market or *tamu* is held. The Dusun *tamus* are ancient institutions and, like the markets in medieval Europe, people could trade peacefully in them in the old days without fear of bloodshed. The present *tamu* was founded in 1915 by the Resident and is a hub of social and economic life on the plain. Here Hill Dusuns from the Kerokot region, and even further afield, come with their tobacco, and sometimes lead bangles, and gaily dyed bamboo and rattan strands for hat weaving. The Plain folk bring poultry, vegetables and fruit, perhaps bamboo musical instruments and hats. Lime made from pounded-up snail shells is frequently seen because the women, but not the men, are avid betel-nut chewers, and lime is always chewed with the nut. The Hill people also buy rice because their shifting cultivation is by no means as fruitful as the Tambunan wet rice agriculture. The Chinese take part too, and sell textiles, clothes, hardware and tinned food, of which the most popular lines are condensed milk and fish in tomato sauce. Occasionally there is an itinerant Indian pedlar from

Jesselton, with a display of cheap jewellery, watches and patent medicines, who overshadows the very few local hawkers. The *tamu* is most animated when Mass is over, for many Dusuns are now Roman Catholics: there are missions at Tambunan and Toboh. This *tamu* seems to be flourishing more than those on the Penampang Plain, where a bus service along a good road into Jesselton has taken much out of the life of the unsophisticated local markets.

The villages themselves are built on land allocated by the government as village or *kampong* reserves. These plots are sometimes slightly higher than the surrounding ground and their irrigation would be difficult. The area of the reserves varies greatly and is an important factor in the size of the village. There are 35 villages scattered over the plain, ranging from Sinsuran with 200 houses down to small *kampongs* such as Gagaraon with less than a dozen huts. Some villagers have their houses tightly

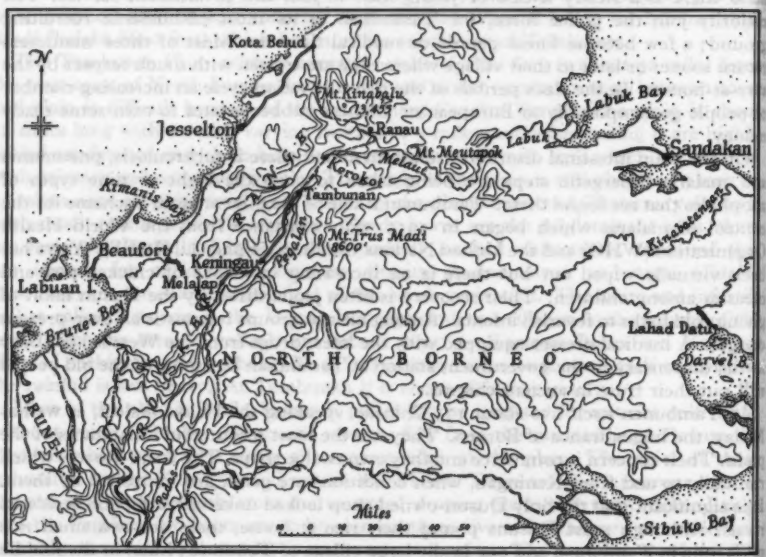


Figure 1

packed, as does Tibabar; others have their houses wide apart, as in the large villages of Nambayan or Toboh. Indeed, in Tebilong, a small village of 14 families, it is impossible to discover a nucleus. The *kampong* reserve was once the site of a *sugindai* where newly taken heads were displayed; and the villagers, with a superstitious dislike of inhabiting a site that was a show place for the trophies of their ancestors, have dispersed to huts on their own parcels of land. There is a slight tendency elsewhere for families to move onto their own small holdings.

There may well be a slow evolution, as conditions become settled, from the crowded security of the long-house into the nucleated or fairly compact village and thence into the isolation of scattered homesteads. About 70 years ago when his parents were young, the headman of Tibabar told us, his village consisted of two long-houses and now there are 24 houses instead. The only suggestion of the long-house on the Tambunan Plain (and these examples are insignificant in comparison with contemporary Murut or Sarawak Dyak forms) are three large houses in the overwhelmingly pagan village of Lumandau, in each of which live three families of second cousins.

The houses follow the general design of village houses in Malaysia. They are built mainly of bamboo and are raised off the ground on hard-wood stilts. One characteristic of them seems unique to Tambunan: the roofs are not an *atap* thatch of the fronds of the nipah or sago palm (the metroxylons do not flourish on the plain) but they are made of interlocking tiles of split bamboo. These picturesque roofs rot after four or five years' exposure to the sun and the rain. The villagers would prefer the more durable *atap* or, even better, corrugated iron to cover their homes, and a few unsightly examples of the latter already exist.

Nearly every village has at least one well. In the rather depressed village of Mangi Pangi, however, where the people drank from a stream and not a well, there were complaints of much dysentery. Among the houses are small vegetable and fruit gardens and privately owned clumps of coconut palms. Vegetables, fruit and tapioca are eaten in addition to boiled rice, the staple food. There are goats, cows and three flocks of sheep on the plain, all of which are used sparingly for meat. The most common meat is pork, either from village pigs or from wild ones hunted in the neighbouring jungle. Chicken is prominent in the Tambunan diet. The Kerbau or swamp buffalo, the most treasured Dusun animal, is only eaten on special occasions—usually at weddings, funerals and harvest feasts.

Another source of protein is small fish caught in the rivers or flooded padi land. In 1953–4 the government introduced fish culture in artificial ponds, a successful measure in Java and Malaya. The "Ikan Nile" (*Tilapia mossambica*) and "Sepat Siam" (*Trichogaster pectoralis*) were received with a fair amount of initial enthusiasm. But the happy-go-lucky Dusuns found the chore of regularly feeding the fish too irksome, they considered their taste too bitter, and the ponds were neglected. Some fish escaped into the streams where they thrive happily and, according to local opinion, taste sweeter.

Buffaloes are invaluable draught animals. They are healthy creatures except for intestinal worms. One of the problems of Tambunan is that when the rice is growing in the fields, there is not enough pasture and the animals get thin. It was impossible for us to tell if there were too many buffaloes for the work that has to be done. Certainly some animals were being sold to the Chinese in Tambunan who send them down to the coast for resale, and thence they are shipped to the oilfields of Brunei.

The most important factor in the life of the villages, and one around which their society has been built up, is the cultivation of wet rice. We collected 18 different types of rice and they seemed remarkably disease free. Padi rust disease, the *sakit merah*, was confined to one small valley during our stay. A man's crop is seldom devastated in a night, as it can be in the hills, by marauding monkeys or deer, although the rice "sparrow" (*Lonchura fuscans*), a dove (*Streptopelia chinensis*) and the Malayan rice rat are nuisances, if not pests. More serious dangers are the insects, the most prominent of which are the padi stem borer (*Schoenobius bipunctifer*, Walk.), the case worm (*Nymphula depunctalis*, Guen.) and the padi (stink) bug (*Leptocorisa acuta*, Thūnb.).

In spite of these hazards yields seem high, especially when it is realized that fertilisers are not used. As far as we could estimate, an average yield per acre in an average year is about 2000 lb. of unhusked rice. There is an ample surplus from the one yearly crop to be fomented into *tapai*. Old men could not recall more than three bad harvests. The average family holding is about 3 acres and this often lies in several scattered plots. Some rich men own as much as 12 acres and a few poor men farm less than one. The holdings of absentee owners are cultivated for them by the poor men in return for one-third of the harvest as rent. In Sinsuran, however, the *adat* or custom is for the owner to receive two-fifths of the yield.

For the actual cultivation, a characteristic Dusun organization comes into play. This is the *mita tebang* in which several families cooperate in performing the heavier tasks on each other's land. Usually two or three members of each family join in and the same families may team together for several years. Membership of a *mita tebang*

is not universal, however; some families prefer to work their own plots in their own time.

The rice year begins in July and the first task is preparing the family's seed-bed. This may be dug next to the house, or on a hillside, or on the edge of the terraced fields. Very rarely are the plots, which are protected by a bamboo fence, used twice.

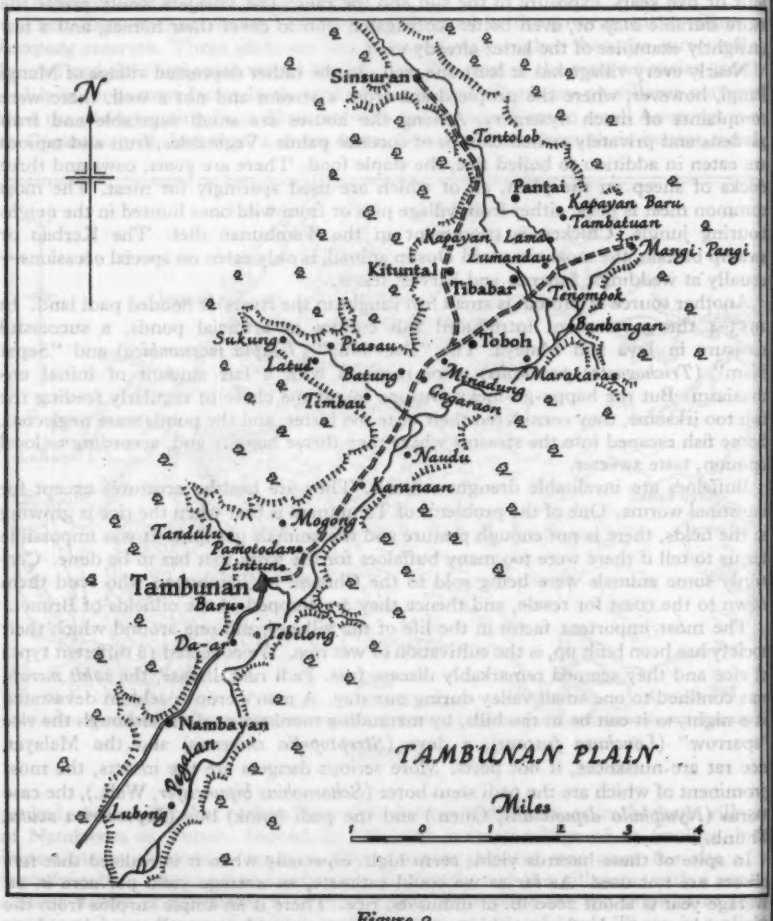


Figure 2

By early August the seeds have been planted and the villagers are in the fields rebuilding broken bunds and diverting streams into the padi land by dams and freshly dug channels. The water trickles down slowly to the lower levels through bamboo pipes or gaps in the bunds. Buffaloes are encouraged to splash about the muddy field to help kill off the grass and the weeds which have grown since the last harvest. By early September the ground is considered soft enough for harrowing, and much of the water is drained off. The square wooden harrow is dragged about the field by a buffalo guided by a rattan rope from his nose, while the driver, either a man or a

woman, stands on the harrow to weigh it down. A few farmers plough their land with a light wooden plough before they harrow, but the majority consider this unnecessary; some, indeed, fear that the plough will stir up infertile soils. In late September or early October the vivid green seedlings are transplanted into the fields which have been flooded again. If the seedlings are over 2 feet in height their tops are sometimes cut off, but a superstition is strong that next year's crop will be poor if that is done. After five days or so the water is drained off the fields in order to strengthen the stems of the young plants and to kill off as many as possible of the *lungau*, the case worm, which floats on the surface of the water. The fields are reflooded after about five days. They remain so until January, when the rice is in the ear and the plants are turning golden.

February is harvest month. The ears are cut with small padi sickles. Threshing usually takes place outside small huts in the fields called *sulaps* where the grain is stored temporarily until the harvest is complete. It is then taken to the villages to be stored in large bins inside granary huts. As a general rule rice is not kept inside the houses because of the danger of fire, although in Latud some rice is kept in the rafters. Winnowing is a job for the women, which they do whenever a fresh store of unhusked rice is needed. The completion of each stage of rice cultivation is celebrated by parties at which the *tapai* flows abundantly.

But the old order changeth. Already there are hints abroad that the simple life of these Tambunan people will become more and more tangled up with that of the wider world. Better communications, the slow push of education (there are three government and two mission schools for Dusuns on the plain), the experiences of the wanderers who have seen something of the changes in this young and rapidly developing colony, the challenge of Chinese energy and skill, and the work of government departments, mean that, in a decade or so, this tranquil and virtually self-sufficient life will have passed for ever.

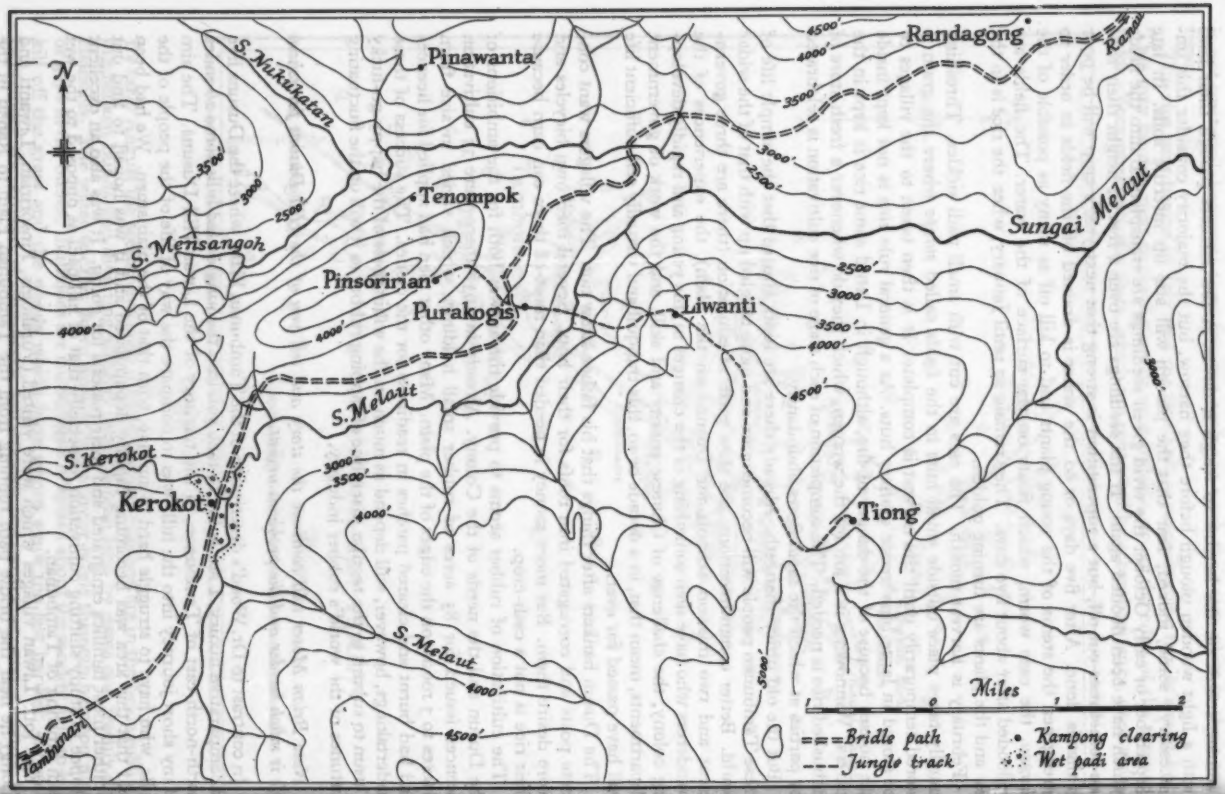
The Dusun hankers after things that his father knew not. The villagers want concrete posts and corrugated iron roofs for their huts. Several men own bicycles and more desire them. But more money is needed than most of them can earn because their rice is not a cash-crop.

The cultivation of rubber seems to provide the answer both for the ambitions of the Dusun and the needs of the Colony. Already in 1956 there were 33 cultivation licences issued for 85 acres of rubber small holdings, which varied in size from 8 acres to 3 roods, on the edges of the plain. Many other men had applied for licences and had burnt and cleared patches in readiness for the clones. The success of these undertakings, however, will depend as much on the willingness of the happy-go-lucky Dusun to submit to the regular discipline of tapping rubber as it will on the fluctuating fortunes of the world's rubber industry.

Now Brian Moser will continue the story and tell you of the Hill Dusuns for whom life is much harder and the problems urgent.

In contrast to Dr. Wood's description of the Tambunan Plain, where the Dusuns live in comparative luxury, I am going to take you into the jungle-clad hills some 26 miles north-north-east of Tambunan, to the territory of the Liwan Hill Dusuns. The aim of my short journey into the hills was to compare the way of life of the people of the hills, who have to struggle hard to survive, with that of the plainsmen. We had been told that this area was becoming rapidly depopulated and it was hoped to find out whither most families emigrated and their reasons for going. It was also an excellent chance to study shifting cultivation, especially that of hill padi as opposed to the wet padi growing of Tambunan.

The four Liwan villages which were visited (Purakogis, Pinsoririan, Liwanti and Tiong) lie near the bridle path running from the Tambunan Plain to Ranau in the north. At present the only means of transport between the two areas is by pack pony or foot over very hilly country. The Liwan is therefore at a disadvantage compared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Bridle path
Jungle track
Kampong clearing
Wet padi area

with the more sophisticated Tambunan Dusun, because all his belongings must be carried on his back.

The relief is dominated by very steep slopes, deep river gorges, gashes in the hillside caused by erosion and, as an ever present back-cloth, the jagged granitic peak of Mount Kinabalu. In this area the altitude is not less than 2500 feet and most villages lie over 3000 feet. The tropical climate is modified by these heights and there is a more noticeable diurnal range than in Tambunan with colder night temperatures. Afternoon rains also happen more frequently, with the result that the day's work stops earlier than in the plain.

The vegetation covering the broken hill scenery is dominated by three colours—the dark green of tall, primary jungle and old secondary jungle, the lighter greens of more recent secondary growth, and the brown of *ladang* patches under cultivation. Often smoke could be seen rising from the patches or people were seen working on them, and it seemed obvious that they were the centre of Liwan agriculture life.

Shifting agriculture is common in the Tropics and it causes concern to governments. Besides its poor yields, this system of farming causes erosion, ruins the primary jungle and hinders the development of the area and its people. The government of North Borneo, for its part, encourages the hill people to leave the hills and to establish themselves where they can cultivate wet padi, work part-time on the rubber estates and receive medical care. It therefore seems likely that the area I visited may be completely deserted in a few decades.

When I arrived in Liwanti at the beginning of September the final burning of the *ladangs* was just finished and the people were beginning to plant their rice. This is the basis of their diet but, unlike Tambunan, it is not cultivated to the relative exclusion of all other crops. Tapioca, sweet potatoes and many other vegetables are grown on the less fertile soil, the first two being essential if the rice crop fails owing to excessive rainfall. The most noticeable difference between the plains and the hills, however, is that the Liwan divides his attention almost equally between the cultivation of food crops and a cash-crop tobacco. The best soil in the *ladangs* is reserved on the one hand for hill padi and on the other hand for tobacco, with which is bought the year's supply of salt, kerosene and clothing.

Ladangs are usually within easy walking distance of the village, although some may be 3 miles or more away. Their site is governed by soil quality, the frequency of cultivation there, and whether domestic animals are liable to roam over the growing crops. In Liwanti land was being cultivated close to the village, but in Tiong, which was twice the size of Liwanti in 1951, all the *ladangs* were over 3 miles away and the people rarely returned home after each day's work.

Each family owns at least one *ladang* and rich ones may own as many as eight. Land is always inherited within the family, but if a fresh family joins the community they must cut down an unclaimed area. This may cause difficulty, since some *ladangs* lie fallow for 15–20 years and, although the owning family may no longer live permanently in the village, the land they once cultivated and the trees on it still belong to them. Thus my guide from Purakogis owned land near Pinsoririan which had been fallow for 15 years; generally the fallow period is only about 5–10 years and this depends on the number of *ladangs* owned by the family and whether they practise a two- or, more rarely, a three-year rotation.

The preparation of a *ladang* for cultivation is complex. In June the trees are felled, the wood and the foliage being allowed to dry until near the end of July when the first burning is carried out. The charred remains are heaped into small piles and after ten days the second burning, *mongurak*, occurs. During August *lalang* grass (*Imperata cylindrica*) is gathered and dried in the sun. At the end of the month or in early September the *lalang* is spread over the patch and set alight at the windward end. This third burning is extremely fast; it kills any weeds that may have grown up and provides extra fertility.

Immediately after this the hill padi is sown and, as with the burning operations,

mita tebangs are at work. These nowadays consist of about twenty men, women and children, although before the war there were only between five and ten in each *tebang*. This increase, according to native chief Kondigi, is due to the Japanese who used large labour gangs on the bridle path. The system used in planting is simple and effective. A row of men walk in front dibbling holes at intervals of 1–1½ feet with a 7-foot-long stock. The distance between the holes varies with the fertility of the soil. About 5 feet behind the men, with their relatively easy job, come the women and children who bend over to drop about four rice seeds into each hole. In this way the patch is sown. Between 2 and 12 days after the sowing another layer of *lalang* is spread over the patch and burnt. This gives a slight protection against birds and provides extra fertility. The *tebang* works through all the village land and is spurred on by parties, where food and rice or tapioca *tapai* is provided by the man whose land has just been sown.

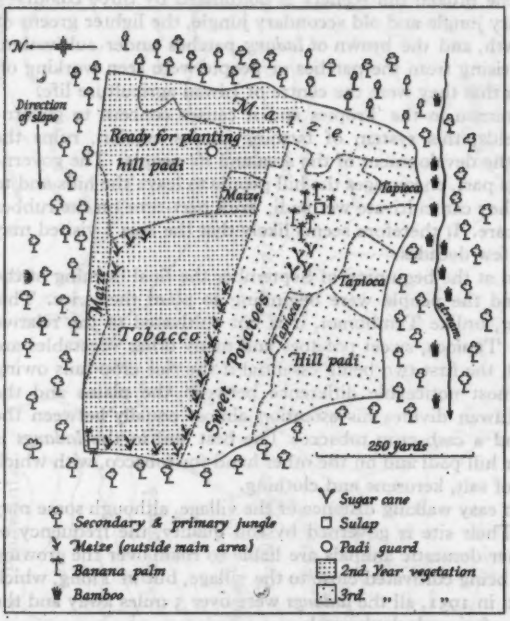
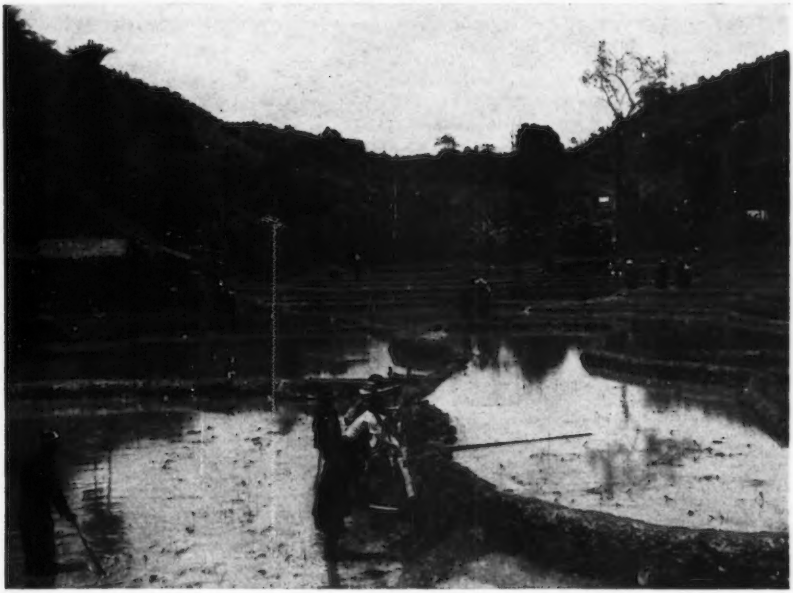


Figure 4

The growing rice can now be left until harvest time in March, but it is weeded twice in the intervening period—at the end of September and during December. As the padi ripens it becomes a great attraction to the birds, monkeys, wild boar and deer which live in the surrounding jungle. The Liwan has to spend much of his time in a bamboo look-out post on the *ladang*. From this he can move an intricate system of rattan strands and brushwood clappers, which produce a frightening din over the *ladang* to scare away intruders. Monkeys are the most persistent pest, and even the blowpipe seems ineffectual. There is a constant demand for shotguns, but few can afford these.

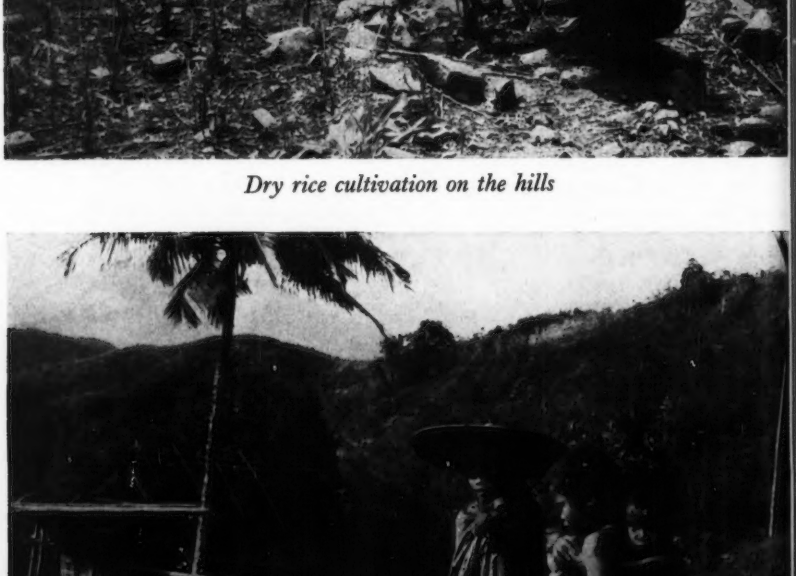
As the diagram shows, tobacco plays nearly as important a part as hill padi in the *ladangs*. It is planted on rich black stony soil directly after the rice harvest in March. The first crop is gathered in June, during July and August the leaves grow again, and a second crop is picked from the end of August to October. After the leaves are picked they are taken in bamboo carriers to the tobacco *sulap*, where they remain for about two days in piles of 20–30 leaves. When they turn yellow they are shredded with a very sharp bamboo knife. The tobacco is then put out on woven bamboo trays which are placed on a long bamboo rack running out from the *sulap* and it is allowed to dry for a further two days. On the following night, if there is no rain, the tobacco is exposed to the moist night air and in the morning it is wrapped into little packets (2×4 inches). These are dried in the sun for a day, left in the *sulap* a further five days, and are then packed into a leaf-lined basket ready to be taken to market at any time during the next year.



Dusun villagers repairing bunds in a wet rice field

A typical small Dusun house

Dry rice cultivation on the hills



Hill Dusuns in typical country

All carrying is done on the Liwan's back and, as most of the trade is done with Papar and Penampang, five days' march away, it is small wonder that the men and women, who carry a load of 40–50 lbs. on their backs, dislike the journey. The main route runs through Kerokot to the northern end of the Tambunan Plain and then to the Penampang Plain via Sinsuran. There is another route to Tuaran. A little trading is done with Tambunan but the amount is small, because of the Chinese shopkeepers' refusal to exchange goods for tobacco. On the coastal plains the price of tobacco fluctuates according to the quantity available. Some years the Liwan receives as much as 6 Malay dollars (1 Malay dollar=2s 4d), in bad years only 3 dollars per kati (1⅓ lb.).

Most tobacco is sold in bulk to traders but some is sold in small packets. These may consist of fine cigarette tobacco, which the Dusuns and Chinese favour, or rougher pipe tobacco preferred by the Bajaus.

Through this tobacco trade the Liwan Dusun sees the easier life of the plains. He soon realizes the advantages of the heavier-yielding wet padi and sees that there is an opportunity to earn money on rubber estates. The first step is to work on an estate in the period between planting and harvesting the rice crop. He may earn enough to buy some wet padi land and so he is able to bring his family from the hills and establish himself in the plains. Other families follow and in the long run a whole village may be emptied. Questions showed that there is a marked tendency for the members of a hill community to go to the same new area. According to the headmen, the people of Liwanti, Pinsoririan and Tiong are going to Papar, and many from the village of Karanan were said to have gone to Buginda on the Keningau Plain—where there is a government settlement scheme in operation. Many Liwans say that they do not want to go to Buginda because they believe there is a shortage of bamboo for house building and of water for irrigation. A visit to Buginda did prove this to have been correct but the dam and irrigation scheme has been considerably enlarged. The coast is still more popular among present emigrants since conditions are more rewarding.

A rapid depopulation was apparent from information gained during interviews, but there was other evidence to be noted. During my first night in Purakogis, two Tiong families slept there on their way to Papar. A few days later my interpreter and I passed an open grass patch on the ridge above Tiong that had once been the site of a *tamu*. It was now deserted but there were a series of slender wooden stakes in the ground. In each of them folded leaves were wedged into slits. There was a distinction between the way men and women folded the leaves and it seemed that 16 men and 9 women had left the area quite recently. Most of these people were Christians, as the crosses on the top of the stakes showed. One was left with the impression that the Roman Catholic Fathers from Tambunan had played a large part in encouraging the people to leave.

Depopulation was obvious in Tiong, a village in four sections, each situated on a small grassy plateau. Many of the bamboo houses with their sturdy and durable *atap* roofs were empty and their doors were fastened with rattan; some were falling down and others were completely ruinous. The headman said that, in 1951, 41 houses were inhabited by 240 people, but in September 1956 only 18 houses were in use and the population had dwindled to 120. He was a sad man because the most enterprising and active people had gone. Liwanti, on the other hand, was not suffering from the same rapid depopulation. The people were happier and more prosperous. Here there was a pagan core to the village because the few Christian householders had left for Papar during the last eight years. Sufficient food from the *ladangs* and the jungle, tobacco growing, and a strong belief in the old way of life held the people of Liwanti together in the struggle to survive amidst the rigours of this precarious existence.

There is no doubt that when the Liwan Dusun leaves the hills for the plains he can contribute not only to his own prosperity but also to that of the whole colony. But when he leaves the hills he leaves behind him a culture which all too soon will become

extinct. As in Tambunan "the old order changeth" and Dr. Wood and I were fortunate to have visited such a charming people as the Dusuns before the old things pass away for ever.

DISCUSSION

Afternoon Meeting, 13 May 1957

Before the paper the PRESIDENT (General Sir JAMES MARSHALL-CORNWALL) said: This afternoon Donald Wood and Brian Moser will tell us about those amiable villagers and peasants, the Dusuns of North Borneo, and show some pictures of the way in which they live and their methods of cultivation. We have with us Sir Roland Turnbull, the Governor of North Borneo, whom we are very glad to welcome.

The Cambridge North Borneo Expedition (1956) consisted of five members, including Dr. Wood and Mr. Moser. Dr. Wood is a demonstrator in the department of geography at Cambridge under Professor Steers, who is also present. Mr. Moser is an undergraduate in his second year at Trinity College. The other members of the expedition were zoologists. A great deal of useful geographical work was carried out and many botanical specimens were collected and brought home for the British Museum. This expedition to North Borneo is one of those expeditions that we in this Society like to support. It had a useful scientific purpose and was excellently carried out, as was the Oxford University expedition to Sarawak about which we heard in this Hall on January 7.

Dr. Wood and Mr. Moser then read their papers

Sir ROLAND TURNBULL (Governor of North Borneo): The problems of the people of North Borneo are not really so simple as they seem, but both speakers indicated that there was a change in the way of living of these people. You have seen what is a relatively small portion in a distant part of a remote country. There was a suggestion that the people of North Borneo could not compete with the Chinese, but do not think for one moment that the Chinese are conducting a campaign to put such people as the Dusuns out. That is not so. The Dusuns are not very active people anyway, whether the Chinese are there or not. The Chinese, in fact, provide the Dusuns with services which otherwise they would not have, and I believe that the Chinese can do more for the Dusuns than even government officers can. Certainly the Chinese agriculturist is closer to the people. If you put a European agricultural officer or administrator to tell the people what they ought to do and show them what can be done, they will say it is "just the Government," but put among them a Chinese helper and let them see what he does, even if he is precisely the same man with perhaps sharper tools and working longer hours, and the Dusuns begin to believe that it is possible for them to do the job. Consequently, the Chinese are playing an increasingly important part, even in the rural economy of North Borneo, and they are inevitably predominant in the wider economy of the area as a whole. In fact, one of the greatest problems is to foresee how these very pleasant people of whom you have heard can be assured of a place in the future of North Borneo.

The PRESIDENT: We have with us also Mr. Robert Speddy who was District Officer in Tambunan and who, therefore, was very closely in touch with these interesting people.

Mr. ROBERT SPEDDY: I do not feel there is much I can add to what Dr. Wood and Mr. Moser have said about a district in which I served for two years, leaving it just before they arrived. His Excellency Sir Roland Turnbull has added his comments to the lecture, so that you have been given a very accurate picture of the life both on the plain and in the hills. Perhaps I could add a comment on Mr. Moser's mention of the people in the hills emigrating to the plains. I was fortunate enough to see them in another district from which they had emigrated and then had been resettled and taught to cultivate wet rice as distinct from dry rice. They did, in fact, seem to be

making quite a good job of it within a very short time of being resettled. As His Excellency the Governor has said, there is no doubt that when the people are given an example by the Chinese they can acquit themselves quite creditably.

The PRESIDENT: There is the interesting question in regard to the probable future movement of the population of North Borneo from the hills to the plain under economic necessities of existence and competing with the rather more affluent conditions prevalent on the fringe of this very wild country. We have with us Mrs. Monica Killingback, who carried out quite a lengthy spell of research work in North Borneo under the Colonial Office. Perhaps Mrs. Killingback will kindly give us some of the results of her researches in North Borneo.

Mrs. MONICA KILLINGBACK: I have been most interested in the lecture because I did, as the President has said, spend two years in North Borneo making a study of the people in the coastal area. It was my good fortune to spend about a fortnight in Tambunan, and nearly a month up in the hills which Mr. Moser has described. During the time I was in North Borneo, about 1950–51, there was much talk as to whether a Jeep road should be put through from the coast to Tambunan direct. I would be interested to learn whether that is still discussed or whether the new road has in fact materialized. The new road goes round in a great circle to reach the coast. When I was in the area there was a track up from the coast on which one could walk and in preparation for the day when the road should be made the Government had planted milestones along the track. The Dusuns thought it a very long road and they had an ingenious idea of shortening it—they cut all the milestones in half!

Dr. Wood described the weekly market in Tambunan. He might be interested to know that the market, which he said was founded by the Government in 1915, goes back, as do all the markets, to long before the European occupation of, or interest in, the country; markets were held in the days when the Dusun were head-hunters. The *tamu* was the ground where the people could meet and have a truce; they would promise not to do any head-hunting while the market was on, so that it became sacred ground and still is to this day. When the site is chosen there is a considerable ceremony of erecting the stones and slaughtering buffalo and feasting. I believe the same applies to the little hill markets.

Mr. Moser's part of the lecture interested me particularly because when I was in the area it was harvest time. I have no first-hand information of the rice planting of which he showed such interesting pictures: but I can endorse his remarks in regard to the steepness of the hills the people cultivate, because I tried my hand at harvesting rice. This is done as in the plain with a small knife—in fact, I did it with my penknife very effectively—but the hillsides were so steep that I often rolled down, much to the amusement of the Dusuns!

I would be interested to hear whether Mr. Moser has any information in regard to the length of the cycle of *ladang* cultivation. I was told that the people thought twelve to fifteen years should elapse before re-use, but from what I gathered the period was more like seven years. I do not know whether Mr. Moser has the same impression or whether the period of cessation of cultivation after use is becoming shorter.

I rather quarrel with both speakers in regard to their assumption that the rice is grown for food and any remaining over is turned into drink. My impression was much the opposite! That is not an entirely frivolous remark because rice growing has considerable religious significance: every stage of it must be celebrated by appropriate rites, and those rites cannot be performed without a feast which involves drinking *tapai*. Therefore it is necessary that there should be plenty to drink. What rice is left they can eat, and when that comes to an end they go on to sweet potatoes and other things. One of the most vivid memories I have of the area was staying for a night in a house in Sinsuran, a big village in Tambunan, of which you saw pictures. I knew there had been considerable parties that night and when I awoke at 4 a.m. and heard the gongs still beating I thought they were still at their feasting. However, all the young children sleeping in the same house suddenly leapt to their feet and

rushed out. It turned out that there was an eclipse of the moon and the people had suddenly seen it. Up and down the village they were lighting great fires and striking their gongs. When I asked what was going on, the village headman said sheepishly: "The children like to play," but I noticed that the village policeman and all the important characters were taking a very active part in this effort to drive away the monster swallowing up their moon.

Sir ROLAND TURNBULL: The road is being built.

Dr. WOOD: As for the market at Tambunan there had been a big battle and the whole area had been declared not sacred, and it was therefore closed down, but it was reopened after a year or two when tempers had cooled off in 1915. A similar thing happened to another *tamu* further up the plain.

Mr. MOSER: Mrs. Killingback raised the question as to how long the people left their *ladangs* fallow. I was told that they could leave them for as long as ten to fifteen years. In actual fact, when going up to Purakogis I passed through an area which the man who was taking me said belonged to him and which had not been cultivated for fifteen years. He suddenly left me and went off into the jungle and up to a coconut palm and said: "This is one thing that belonged to me and will always belong to me." This proved that the *ladang* had been left for a long time; the area was very dense secondary jungle. Generally, I think it can be said that owners of a lot of *ladangs* leave them fallow for a long time. The native chief who has at least eight *ladangs* can leave them fallow for about ten years; if a family is poor, with only two to four *ladangs*, it can only afford to leave them fallow for a maximum of four years. Thus the poorer people are automatically worse off because the crops will never be as good on ground which has been left fallow for so short a time.

Asked why the fires did not spread to adjoining jungle when trees were cut down and burnt,

Mr. MOSER replied: The people cut down the trees and then leave them to dry; all the branches dry and the dead leaves form a base from which to start a fire. It is not easy for these patches to be set alight; in a tropical area there is an enormous amount of rain and in the hills it is common for it to rain for the whole afternoon. The Dusuns always have the problem as to whether the wood they have cut down will dry sufficiently to burn, and in fact in many areas it is not dry enough. When they are unable to burn the area and get their rice crop, they depend on secondary crops such as tapioca and sweet potatoes.

AN EXPEDITION TO WEST GREENLAND, 1956

M. F. W. HOLLAND

THERE ARE TWO regions of alpine country in the central and southern parts of West Greenland and they have attracted numerous expeditions. The most interesting and extensive group of high, jagged peaks lies between Sukkertoppen and Holsteinsborg and this group reaches its climax inland of Kangamiut on the south side of the Sukkertoppen ice cap. Three great fjords break into the gneissic massif and the central one, Eternity Fjord (Evighedsfjord), splits into two branches the highland ice cap to which the island village of Sukkertoppen gives its name. The general height of the northern lobe of the Sukkertoppen ice cap is about 5000 feet and the mass of ice is separated from the main Greenland ice sheet by a deep and partly ice-filled trench, the Sarfortak valley. Between the southern edge of the northern branch of the ice cap and Evighedsfjord is a group of heavily glaciated peaks with a series of deeply incut valleys carrying quickly moving ice streams which have their sources on the ice cap. Among the alpine peaks are a number of high snowfields, the accumulation areas for other glaciers, some of which are tributary to the main ice streams, and others of which take an independent course towards the waters of the fjord which they may or may not meet.

The culminating massif is Mount Atter, 2190 metres, and the peak is named after Michael Atter who met his death during the first Oxford University expedition to visit this region of West Greenland in 1935.[1] This expedition, led by H. O'B. Hayward, approached the ice cap from the north, by way of Søndre Strømfjord; they worked along the eastern edge of the ice and crossed the ice cap and, like the second expedition in 1936 led by Peter Mott, attempted to reach what they believed to be, and later proved to be, the highest mountain in the area. The peak was then called Mount Taterat and the group of peaks in the area the Taterat Berge, but the two expeditions were unable to approach near enough to the peak to make a serious attempt to climb it. The two expeditions carried out a great deal of exploration and mapping as has been reported in the *Geographical Journal*,[2, 3] and their work also included a detailed glaciological programme.

In 1938 another Oxford expedition, led by J. C. G. Sugden and P. G. Mott, approached the ice cap and the mountain from the south, by way of Evighedsfjord. Landing near the snout of the Taterat glacier the expedition set up their main camp at the junction of Survey glacier with the main ice stream. The party found that a route up the Taterat glacier was impracticable so they ascended to the southern edge of the ice cap by a western tributary, Igdlo glacier, at the head of which they established the second of their two glaciological stations. The extensive programme of work[4, 5] occupied most of a long season; however, an attempt was made to approach the south side of Mount Atter but was eventually abandoned.

In 1956 a further expedition originally planned at Oxford and organized in the geography department of Bedford College, University of London, set out for Evighedsfjord to continue the programme of glaciological work begun by the previous expeditions and also to attempt the ascent of Mount Atter from the south and to try to

[1] *Geogr. J.* 88, 2 (1936), pp. 148–64.

[2] *Ibid.*

[3] *Geogr. J.* 90, 4 (1937), pp. 315–34.

[4] *Geogr. J.* 95, 1 (1940), pp. 43–51.

[5] "Expeditionsbericht der Grönland-Expedition der Universität Oxford 1938. Veröffentlichungen des Geophysikalischen Instituts der Universität Leipzig; Spezialarbeiten aus dem Geophysikalischen Institut und Observatorium, Band XIII, 1940." The report was written by E. Etienne, a German and a Rhodes Scholar. (See reference to Etienne on p. 75, *Glaciology*).

sledge up the Taterat glacier. The expedition owed much to the reports of the previous expeditions, to the advice of Peter Mott and to the help and encouragement given by the R.G.S., the Principal of Bedford College, and Professor Manley, the staff and many undergraduates of the geography department of Bedford College, to the officers of the Oxford University Exploration Club, and to the Scott Polar Research Institute. Generous grants were received from the R.G.S., the Mount Everest Foundation, the School of Geography, Oxford, and Somerville College and St. Edmund Hall, Oxford. Grants were also received from other organizations and a great deal of food and equipment was provided by many business houses.

The expedition of five members (I. C. Bennett, I. Morin, M. F. W. Holland, Miss G. R. Sutton and Miss D. Morin) left Harwich on July 5 and travelled to Copenhagen where further kind help was provided by the Ministeriet for Grønland and Dr. Børge Fristrup of the geography department of Copenhagen University. On July 10 the expedition sailed on the m.s. *Disko* and reached Godthaab on July 19. The landing at Godthaab, the capital of Greenland with a population of about 2300, was very impressive because despite our foreknowledge of the many and swift changes which have occurred in recent years we did not fully appreciate contemporary conditions in West Greenland.

The first visible sight of human occupation, after we had left behind the large icebergs which hug the shores of the southern parts of the west coast, was a group of silver- and orange-painted oil storage tanks clinging precariously to rocky headlands. At length a small quay came into view with a large ferro-concrete warehouse looming behind. On the quay a group of Greenlanders and Danes welcomed the ship and as the *Disko* came alongside small Greenlander children dressed in native costume waved artificial flowers in greeting. Intense activity soon began on the quay as bricks, wooden battens, prefabricated houses, steel girders, food and drink were lifted from the holds and borne away by small trucks. As I went ashore and began to walk up the dirt road I was passed by trucks, all driven by cigarette-smoking Greenlanders. After leaving the natural rock pier which connects the new harbour with the main part of the settlement, we saw Godthaab come into view. The houses are small though some do have one storey; they are made of wood and set on firm rock foundations, and gaily painted in reds, greens, blues and white, but the first group of buildings to attract my attention was the new T.B. sanatorium with 200 beds. With the aid of a boat which visits all of the settlements on the west coast the staff of this new hospital, built and maintained by a public subscription fund organized by the Queen of Denmark, believe that they will eliminate tuberculosis from the Greenlanders within ten years. Among the other unusual buildings in the settlement are a café, a shop selling chewing gum and Coca Cola, and another selling radios, gramophones and all the associated accoutrements. Indeed, the town has most of the amenities of a northern Scandinavian coastal town; an active radio station and post office, a well attended church, two schools and a technical college, very hygienic shops and the principal administrative buildings in Greenland. Godthaab is the seat of administration and the meeting-place of the Greenland Council which holds one session of a month each year. New buildings under construction include a kindergarten, wireless station, sewage works and dwelling-houses, while new roads and port and harbour improvements appear to be in continuous progress. A reservoir has recently been constructed, and an all-year-round water supply provided to a block of new flats and to the hospitals and other public buildings. All the materials to construct the new buildings as well as the fittings and furnishings have to be brought by ship from abroad.

These developments in Godthaab are typical of the progress being made in western Greenland and they are indicative of a great change which has overtaken the inhabitants of the country in the last forty years and which has been especially accelerated since 1945. The explanations are to be found partly in the Danish administration since 1721 (Greenland became part of the Danish Realm in 1953) combined with their great sympathy for, and understanding of, the Greenlanders, and partly in

changed economic conditions in the last forty years; these will be discussed at the end of the paper.

The expedition was very well received by the Danish Authorities in the person of Herr and Fru N. O. Christensen and Herr and Fru Erik Hesselbjerg and the party stayed in a small Greenlandic house for four days before sailing for Evighedsfjord on July 24. The small motor-driven police boat *Eli Knudsen* was made available, manned by three Greenlanders, and after a delay due to a storm, and to calls at Sukkertoppen and Kangamiut, the boat was cruising off the snout of the Taterat glacier early on the morning of July 26. The tide was out and a good landing spot was found on moraine on the eastern side of the fjord, perhaps the only really suitable spot in this part of a fjord remarkable even for a fjord in the steepness of its walls.

Several days were spent in ferrying the stores up the fjord and in finding a route on to the glacier and in establishing a dump on the ice. The snout was very active and our activities were enlivened by frequent cannonades from the ice calving into the water and making large waves. The outboard motor was put out of action by unplanned submergence but this was, apart from the tribulations of steep and unstable moraine, the only hindrance because the weather was generally good, though some days of heavy rain halted operations.

Figure 1

Very late on August 7 an advance camp was set up at about 350 metres above sea level, 1 kilometre beyond the site of the camp of the 1938 expedition, which was clearly shown by a large quantity of debris lying on the ice, much of it in very good condition. While this camp was being stocked, Holland and Denise Morin found a route up Survey glacier to the high "Basin," a snowfield at about 1200 metres on the south side of Mount Atter. In the planning of the routes for the expedition much use had been made of the Danish maps [1] and aerial photographs and of the advice of Peter Mott, and it seemed that once the ascent to the Basin had been achieved only two other difficulties would remain in completing the ascent of the mountain, an ice slope or rock buttress on the approach to the foot of the west ridge and near the top of that ridge. Three heavily crevassed sections were negotiated in the 850 metres' ascent from the advance camp to the Basin; the path was tortuous and mobile even though the ice falls may be small counterparts to the giants of other mountainous areas. The ascent was possible in one day but it was impossible to carry heavy loads the whole way in one day's journey and a dump was established from which a Basin camp was set up and stocked for three weeks by August 11.

On August 12, more in the spirit of a reconnaissance than a serious attempt, and

[1] See Danish 1:5,000,000 map; Grønland; Geodaetisk Institut, 1954, and Grønland 1:250,000 map 66 V.1 Holsteinsborg; Geodaetisk Institut, Copenhagen, 1952. Details of maps are given in the *Polar Record*, 8, 52 (1956), pp. 39–42.

by way of a steep ice slope or a rock buttress in the north-west corner of the Basin, the party ascended to the snowfield below the west ridge. The climb continued in perfect weather, but was slowed by the difficulties near the top of the ridge where an iced pinnacle was negotiated by means of an eyelet on its southern side, and where overhanging rock was breached by a 30-foot wall with a crack. The ascent was completed over snow slopes to the summit, which was reached at 7.05 p.m. The descent was facilitated by the long hours of daylight and the westerly facing slopes.

The party stayed in the Basin until August 26 and during this time nine other summits were climbed on the six massifs surrounding the Basin. For much of the time the weather was extremely good with several hours of sunshine each day. Poor conditions were experienced on two days but this did not preclude other activities by the scientifically inclined members of the expedition. It was during this time and the period spent at the base camp that most of the work was carried out as reported in the appendices. There is a reasonable route up all the peaks around the Basin when they are tackled from high snowfields at about 1200 metres; when attempted by northern routes the ascents will be almost entirely on snow and ice but southern and western routes will usually involve rock work which, considering the possible amount of shattering by frost, is remarkably stable. The steeper the slope the cleaner the climb and the higher and gentler the slope the looser will be the rock. The extent of the glaciation is due to the coastal position and the depressions travelling along the Davis Strait. The summer of 1956 was, according to local authority, the best in living memory and the weather was remarkably good until September. The firn line lies at about 950 metres on the main ice streams so all the snowfields are accumulation areas and the snow tends to become soft under the midday sun; skis are advisable for travel. The morasses at the firn line are below the snowfields and are, happily, tempered by the steepness and crevassed nature of the ice which speeds the rate of run-off of the melt-water. Lichen is found on most rock ridges but it was not a serious difficulty in 1956. Some snowfields are inaccessible because the use of the approaches on the glaciers is unjustifiable and so some peaks must be tackled from well below 1200 metres and then the rock climbing may be of decidedly higher standard and at times impossible. The impossibility is chiefly due to ice avalanches from overhanging glaciers which are a characteristic feature of the region. For example, on the north side of Mount Atter where the rock leans back the frequency of the avalanches renders any attempt utterly impracticable; this fact was early appreciated by the previous expeditions.

On the evening of August 27 the party was back at base having evacuated the Basin camp and preparations were made for the next journey, the attempt to sledge up the Taterat glacier to the southern edge of the Sukkertoppen ice cap. The party consisted of Bennett, Gillian Sutton and Holland, and they left the base on August 31, in tolerably good weather which held for four days, by which time two-thirds of the ascent had been completed. On September 3 the party was portaging the sledge load and sledge through the second of the badly crevassed sections when, with a suddenness surprising even for these regions, a storm blew up heralded by heavy cloud and showers of hail which soon turned to snow. The blizzard abated somewhat after twenty hours but continued until it was possible to make a reconnaissance on the afternoon of the 6th. Winter conditions had set in, the snowline had descended some 600 metres and at least 10 inches of fresh snow lay on the glacier. The journey was continued under rather difficult conditions for the next two days and the edge of the ice cap was reached, but another blizzard began on the 8th and it was not possible to begin the descent until the 10th. High up the Taterat conditions were easier for camping than on the bare ice of the lower glacier. Skis could be used to anchor the tent and walls of snow blocks could be built to shield the tent. A light mountain tent was used and the nylon sledge cover was suspended over the tent for additional protection. Several items of equipment had been lost in the blizzards but the chief difficulty, apart from the tendency for the sledge to bury itself in the snow, was the lack of visibility;

this not only made the route difficult to find but hindered the opportunity to work. We found that in these conditions so much time is taken up in cooking, in striking and setting up camp, and so much energy used up in pulling the sledge, that the additional problems of bad weather with its attendant lack of visibility, commonly described as a "white-out," reduce the amount of work possible to a mediocre amount. Some

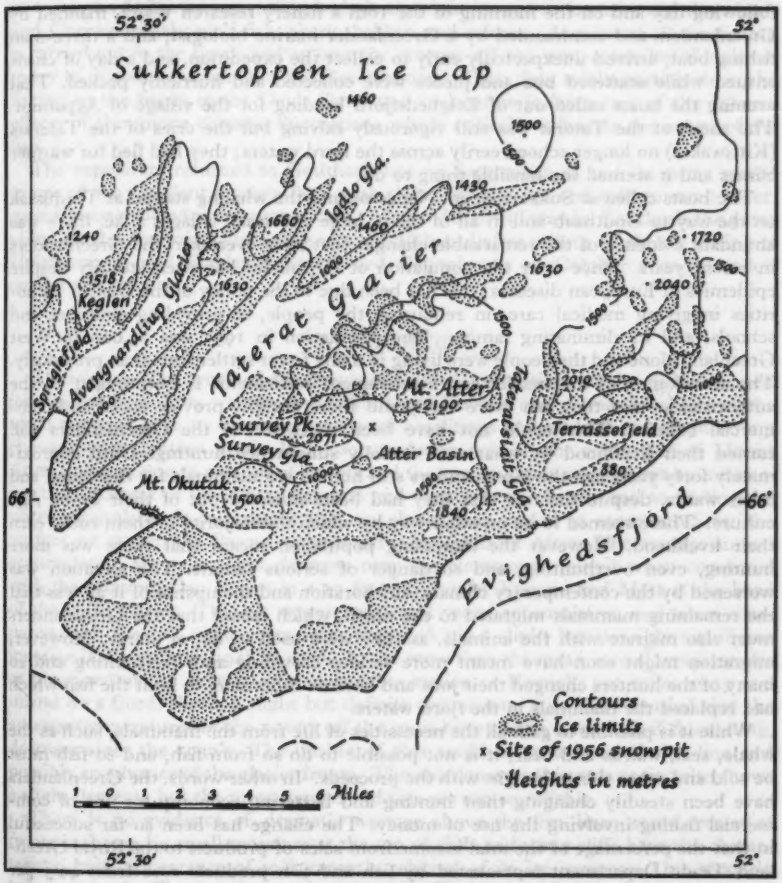


Figure 2

useful geomorphological work was done and the ascent of the glacier had been completed for the first time, but the route is not recommended as an easy approach to the ice cap. Most of the ice flowing into the glacier comes from the Sukkertoppen ice cap and from the northern end of the snowfield at the head of the Tateratsiait glacier and the ice is heavily crevassed where it falls down to the Taterat; there are two other badly crevassed sections beneath the upper fall, both below the firn line. The tributaries to the main stream are all quite small but large quantities of ice fall down the sheer walls of the valley sides from hanging glaciers on the higher, level sections above

1200 metres, especially from the Atter massif. There is some evidence for the wastage of the glaciers in this region but it is not at all dramatic.

The descent of the Taterat was continued until September 13 when the sledging party joined the others who had remained at advance base from which, in one of the few days of reasonable weather, they had made an ascent of Igdlo glacier to the presumed site of Mott's 1938 glaciological research camp. Base camp was reached the following day and on the morning of the 16th a fishery research vessel, manned by Greenlanders and commanded by a Greenlander marine biologist, and a three-man fishing boat, arrived unexpectedly early to collect the expedition, and a day of chaos ensued while scattered bits and pieces were collected and hurriedly packed. That evening the boats sailed out of Evighedsfjord heading for the village of Agpamiut. The snout of the Taterat was still vigorously calving but the cries of the Taterats (Kittiwakes) no longer echoed eerily across the fjord waters; they had fled for warmer climes and it seemed the sensible thing to do.

The boats called at Sukkertoppen, Napassok and the whaling station at Torqussak on the way to Godthaab and in all of them, large and small villages alike, there was abundant evidence of the remarkable changes that have overtaken the Greenlanders in recent years. Since 1721 the population of Greenland has risen steadily despite epidemics of European diseases; this has been due to the policy of the Danish authorities in giving medical care, in rehousing the people, in providing churches and schools, and in eliminating famine. The population in 1953 was 23,000 in West Greenland alone and the people were living in many fewer settlements than previously. The abandoning of the smaller and inconvenient settlements is encouraged by the authorities so that they can more easily and more cheaply provide social and commercial benefits. This could not have been successful if the Greenlanders still earned their livelihood by what was virtually subsistence hunting. Until approximately forty years ago the Greenlanders still hunted sea mammals for their food and other wants, despite the fact that they had been educated out of their Stone Age culture. There seemed to be no other way by which the majority of them could earn their livelihood. However the increasing population meant that there was more hunting, even overhunting, and so danger of serious famine. The situation was worsened by the contemporary climatic amelioration and the upshot of it all was that the remaining mammals migrated to the north, which meant that the Greenlanders must also migrate with the animals, as they were used to do, or starve. However, migration might soon have meant more serious crowding and overhunting and so many of the hunters changed their jobs and became fishermen, to hunt the fish which had replaced the mammals in the fjord waters.

While it is possible to gain all the necessities of life from the mammals, such as the whale, seal, walrus and bear, it is not possible to do so from fish, and so fish must be sold and other things bought with the proceeds. In other words, the Greenlanders have been steadily changing their hunting and bartering economy for one of commercial fishing involving the use of money. The change has been so far successful in that the percentage of the total income from sales of products to the Royal Greenland Trade Department represented by fish and fish products rose from 49·5 per cent. in 1939–40 to 70·4 per cent. in 1953 and the value rose from 373,000 D.Kr. to 4,000,000 D.Kr. over the same period, and the value of hunting products fell from 45·6 per cent. to 22·9 per cent. At the same time the number of people engaged in fishing increased, as did the number of motor-powered fishing craft owned or operated by Greenlanders, from 65 in 1938 to 492 motor boats and cutters in 1953. The policy of concentration is well shown by the decrease in the number of plants for the processing of fish products, from 115 in 1939 to 77 in 1953, while the floor space increased from 7600 square metres to 16,000 square metres. Five freezing plants are now operating and there are now 41 fish-drying plants, all set up since the last war. This policy is designed for a much more efficient production.

The principal catch is cod and the total estimated production including home con-

sumption increased from 10,000 tons in 1939 to 25,000 tons in 1953. Much of the fish is salted, some is dried and some frozen and it is exported to Europe and America, and cod sales to the Royal Greenland Trade Department represent 51 per cent. of the total income from sales of products to that department, and valued at 2,900,000 D.Kr. in 1953. Other fish, fish products and similar products account for 19·4 per cent. of the total income from sales to the Royal Greenland Trade Department, valued at 1,009,000 D.Kr. in 1953; they include shrimps, canned at factories at Julianehaab and Christianshaab, wolf-fish, shark, halibut and salmon. At present all the fishing is carried out in the fjords and among the skerries off the west coast, but the aim is to try to introduce trawling to the Greenlanders. Thus they might participate in the fishing on the banks in the Davis Strait and so become independent of the adverse effects of the minor climatic fluctuations which critically influence the habits of the fish.

The expedition returned to Godthaab late on September 18 and the party stayed in one of the excellent modern flats, with electricity and hot and cold running water, recently constructed at very great cost. After a delightful stay in Godthaab the party sailed on the *Dronning Alexandrine* on the 26th and after sailing north and calling at Holsteinsborg and Egedesminde reached Copenhagen on October 7 and London on October 11.

APPENDICES

Glaciology.—The work of the previous Oxford expeditions to the Sukkertoppen ice cap has been fully written up by Mott and Etienne and it was the object of the small party of 1956 to compare the glacial conditions and attempt to recognize any changes over eighteen years. In an accumulation area on the south side of Mount Atter a pit was dug to a depth of 22 feet and the accumulation worked out by measuring the thickness of the annual deposits and their average density and so finding the water equivalent. It is thought that an eleven-year period is represented by the 22-foot pit dug in the Basin on the south side of Mount Atter. The average annual accumulation shows a slight decrease over the eleven-year period when compared with the accumulation shown in a 17-foot pit dug by Etienne and Mott at the head of the Igdlo glacier. This pit represented eight years' accumulation and when compared with the last eight years from the 1956 pit a slight but possibly significant increase is shown from 1948 to 1956. At the same time the mean annual temperatures as measured at the nearest reliable weather station at Kornok, 100 miles away and inland on a fjord, shows a slight but definite depression. It is also recorded that the average temperatures in the waters off the coast have shown a marked, if fluctuating, decrease since the 1930's. The upshot of this could mean a lowered firn line and possibly an advance of the glacier fronts. The ablation over the same period also shows a slight decrease but the measurements of this are not so reliable.

There is no evidence of dramatic wastage above the firn line; some retreat of fronts is shown by small moraines at the top of cliffs and some cliffs have the characteristic fresh appearance of rock recently relieved of its ice carapace. One westerly tributary to the Taterat glacier, shown on the Danish maps as joining the main ice stream, now no longer does so and other moraines show the former extent of ice masses that could not have been very thick.

At 350 metres at the junction of Survey glacier with Taterat glacier, Mott's old camp site was found. It can have moved very little downstream and though there are ice-cored moraines some 12 metres high nearby the amount of down-wastage over eighteen years cannot have been great. The camp appears to be situated on a relatively slow-moving ice wedge between the ice from the main Taterat stream and that from Survey glacier. The tributaries contribute a relatively small amount of ice to the glacier but the main moraines develop at the junction of the Survey and Taterat glaciers.

A photograph of the snout taken by Mott in 1938, and published in the Society's *Journal*,[1] shows the ice front to rest upon a series of small but obvious rock exposures. The ice cliffs were in exactly the same position in 1956. This would seem to accord with the conditions in the accumulation area. The condition of the moraine at the edge of the glacier shows that there has been a small amount of thinning at the edges, but again, nothing remarkable. Two terminal moraines, at approximately 2 and 4 kilometres respectively from the present ice front show the former advanced position of the glacier and the lateral moraines indicate a much greater thickness.

Geomorphology.—The characteristic feature of the landscape is the marked division of the topography into two distinct types, above and below the approximate height of 1200 metres. Below that height the vertical relief is great, the valleys are sheer and gloomy and the glaciers are etched deeply into the mountains. The valley sides are steep, even vertical, and the only level areas are on the ice or the moraines. The only possible way to move is along the valley bottoms: the country is so heavily glaciated and all the large valleys are filled with ice. Above this level of 1200 metres the topography changes; at high levels corries are still being actively eroded into their characteristic armchair shape, but the dominant feature in the landscape is negative, the destruction of prominent features rather than their creation. This is due to the activity of frost erosion without the concurrent transportation of the debris outside the region by glaciers; it is the periglacial morphogenetic region of Peltier,[2] passing to the maritime morphogenetic region towards the coast of Davis Strait where the greater precipitation, especially in the form of rain, causes extensive and intensive mass movement and stronger fluvial erosion.

The deep valleys are typical of the landscape up to 1200 metres and they are the characteristic result of true glacial erosion. Linton, in his article on watershed breaching by ice [3] has described such valleys from Scotland and they may in fact be interpreted as the "fossil" landscapes of the glacial erosion typical of parts of West Greenland. Above his deep-set valleys Linton shows a more gentle landscape, with flatter areas, a landscape with an horizon. This too is characteristic of the upland areas around Mount Atter, and the Scottish type may be the fossil landscape of the processes, and hence the climate, now operating in West Greenland. Above 1200 metres corrie-type erosion is dominant; intense frost shattering aided by abundant supplies of melt-water from the isolated areas of melting above the firn line and the transport of the debris by corrie glaciers or by avalanche or mass movement of ice. Flat benches are formed where the action is intense and extensive, or "armchair" type corries where the erosion is concentrated and the fact that three levels appear on most of the mountains may indicate that there have been three phases of the corrie erosion. If so this may correlate with the three icefalls or rock-steps which are a feature of all the glaciers or glaciated valleys of the region. These may indicate three major climatic oscillations or three relative movements of sea level with the rock steps [4] being cut into the mountains by the dominant vertical erosion of the glaciers combined with headward retreat of the rock steps. This contrasts with the typical lateral erosion of the corries and it is the differing processes of erosion caused by the different local weather and climatic conditions which cause these differing morphogenetic regions on a rock, gneiss, characteristic of the whole area.

Notes on equipment and food.—Windproof clothing was provided by Messrs. Aquascutum, made of nylon cotton and nylon; they are quite windproof and waterproof, are light and they dry quickly. Cellular blankets by Lan-Air-Cel were taken

[1] *Geogr. J.* 95, 1 (1940), p. 44.

[2] Peltier, L. C., "The geographic cycle in periglacial regions as it is related to climatic geomorphology." *Ann. Ass. Amer. Geogr.* 40 (1950) pp. 214–36.

[3] Linton, D. L., "Watershed breaching by ice in Scotland." Institute of British Geographers, *Transactions and Papers*, 1949, pp. 1–16.

[4] Lewis, W. V., "Valley steps and glacial valley erosion." Institute of British Geographers. *Transactions and Papers*, 1947, pp. 19–44.

in addition to sleeping bags. They too are light and very warm, dry quickly, and were a tremendous boon. Prestige pressure cookers are now standard to expeditions and save a great deal of time and trouble, especially when snow has to be melted and when dried vegetables are taken. Another feature was the use of Thermos vacuum flasks. These were kept constantly filled with hot drinks or soups and they shorten considerably the time spent in middle-of-the-day halts which can be unpleasant when the weather is cold, and they permit more time to be spent in work; they are invaluable too when bad weather interrupts cooking in a small tent; they travel well. Pemmican was eaten very little and was replaced by tinned meats which were more than adequate and much more pleasant to eat. Dried vegetables supplied by the Ministry of Food were a great success, as was rice, especially flavoured with curry. Tea, coffee, cocoa and Ovaltine were all regarded as essential. The scientific apparatus did not travel well and it is vital to have instruments packed doubly securely to avoid human error. It is also advisable to have a repair outfit in the field that will mend the tripods of plane table apparatus and also will repair sledges, skis and tents; skis can be a great nuisance but are essential at times when they can improve the safety factor enormously. A base camp was constructed with great success from Dexion Aluminium Angle and from tarpaulins. In medical equipment the greatest needs were for sun cream, relief for the eyes, the stomach and feet, and treatment for cuts and abrasions.

[*Editorial Note.* As reported in the *Journal* for December 1957, Michael Holland lost his life in July 1957 while on the Danish I.G.Y. expedition in northern Greenland. The leader of the expedition, Dr. Børge Fristrup of Copenhagen University, has contributed the following brief account of the work on which Michael Holland was engaged and of the circumstances of his death.]

After finishing his own expedition to the Sukkertoppen ice cap in 1956, Michael Holland got into touch with the Danish glaciologists, and in 1957 he was a much valued member of a Danish expedition to north Greenland. This expedition was part of the Danish I.G.Y. work in Greenland, and had concentrated the glaciological investigations on Hurlburt Brae in the Thule district. While the inland ice of Greenland, especially of late years, has been studied by French, British and American expeditions, Danish glaciological work has been concentrated on glaciers outside the ice cap; for the International Geophysical Year three stations were established in north and west Greenland (1956–7) and two or more stations are planned in east Greenland for 1958. The main purpose of these expeditions is a detailed study of the relation between glacier oscillations and climatic changes, and in addition various investigations have been carried out on problems of glacial meteorology. The 1957 stations consisted of Sermersoq in south-west Greenland, Sermikavsaq on Upernivik Island (in Umanaq Bay), and Hurlburt Brae, in north Greenland. Michael Holland was a member of the group on Hurlburt Brae; he left Copenhagen on 16 May 1957 by plane for Greenland, and the last part of the journey, from the Thule Air Base to Thule itself, and to the glacier beyond, took place with dog teams.

The surveying on Hurlburt Brae started in 1956; a base camp was established at the coast on Inglefield Fjord, and during the winter of 1956–7 some measurements of ice temperatures and so on were made by a member of the Danish magnetic station in Thule. The investigations started again in May 1957. Two lines of ablation poles were established on the glacier, the movement of the stakes was surveyed, and very careful meteorological observations were taken—both from the meteorological station at base camp and from a secondary station with self-recording instruments 3000 feet up on the ice cap. The ice temperatures down to 50 feet were measured with an el-resistance thermometer at two stations—one on the ice cap near the meteorological test screen and one on the lower part of the glacier. The ice cap station was established by dog teams; a camp on the ice cap was also set up and a supply of food and oil for more than two months was brought up on sledges.

In view of his fine scientific qualifications, his ability as a mountaineer, and his Arctic experience, it was natural that Michael Holland should be chosen as leader of the Hurlburt party, when I, as leader of all three stations, had to go to south Greenland to look at the work there. The group on Hurlburt Brae now consisted of only three men—Michael Holland, Carsten Velsboe and Hans Valeur Larsen.

When I left the camp on July 3 the surveying of the glacier and the meteorological observations were carried out according to the original plan. On July 15, Michael Holland and Carsten Velsboe left base camp on the coast and went up to the ice cap camp to take readings of all ablation poles, and if possible also to survey the trimlines along the northern side of the ice cap. They planned to be away for one or two weeks. On July 20 the Thule district was struck by one of the worst blizzards for many years. The weather had been unsettled for some days. A strong gale raged early in the morning of July 20, but it died down again and at 09.00 hours the wind was only 8 miles per hour, from the east, and the temperature was 7·4° C. Before noon, however, the wind rose again and from 11.30 hours a real hurricane blew up, with gusts reaching more than 100 miles per hour—possibly 120 to 125 at the worst. The wind was now from the south or south-east, and owing to a föhn effect the temperature went up to 12° C. The air was thick with drifting sand and pebbles, and on the glacier the weather was even worse, and the temperature was probably only slightly below zero (Celsius).

According to the diary which was found on Michael Holland, he and Carsten Velsboe, on the morning of July 20, were travelling on the ice cap from Olriks fjord to the ice cap camp. They had been surveying at Olriks fjord and after midnight on the 20th they started back, following the lines of ablation poles. Holland took readings at all ablation poles and, according to his diary, we know that he was at a pole ten minutes' walk from the ice cap camp at 6.32 a.m. The last words in the book are "*snow storm*". The two men had a *pulk* (or small sledge) with them with their tent, sleeping bags, Primus and personal equipment. From the base camp to the ice cap camp was only 8 kilometres and in good weather it was possible to walk down in two hours. The ice cap at that time of the year was nearly free of snow and the bare ice was exposed. There were very few crevasses on the ice cap, but around the point where the glacier descends from the ice cap to the coast there were some crevasses; most of them were open, however, and we all knew the trail very well.

When the two men did not return at the stipulated time Hans Valeur Larsen, who had taken meteorological observations at the base camp, started a search. He went up alone to the camp on the ice cap, and en route to the camp he found the sleeping bags lying on the ice—each sleeping bag consisted of two bags one inside the other, and he found four bags lying scattered over the ice. He found the tent lying down, the tent poles out, and the tent itself just laid down and secured with an unopened wooden box containing 25 kilograms of provisions. Other boxes of food were open and scattered around, there was a full jerrycan of oil for the Primus, and in the tent between the floor and the canvas Valeur found two air mattresses, two dishes of nearly finished food, a Primus and some private belongings. The tent was in good shape apart from some repairs to the guy ropes. Two pairs of skis were lying beside the tent, but the sledge had disappeared and was never found. Both the tent and the meteorological test screen were secured with rope or wire, and anchored with ice anchors of the usual Eskimo type, such as is used by all travellers in north Greenland. Valeur realized that an accident had occurred and began a systematic search all over the glacier. On July 31 the body of Michael Holland was found on the ice nearly 2 kilometres to the east of the normal route, in a safe place without crevasses. There were indications that Velsboe had stayed with him to the last. The two men had apparently been roped together and there were signs that Holland may have tried to stop his companion from falling into a crevasse. That such was finally Carsten Velsboe's fate must be assumed, for in spite of intensive search operations, his body has never been found. Holland's body was brought down by a party of Eskimo, an operation organized

by the Inspector of North Greenland—E. Mørk Rasmussen. A post-mortem on Michael Holland was made in Copenhagen, showing that he had been in excellent health, and his death therefore most probably had resulted from exposure. After finding the body of Holland, Valeur made contact with Thule and from there I got a radio message at the Thule Air Base on my way back to Hurlburt Brae. The American Air Rescue Service immediately came to my aid with all their resources and, as soon as the weather allowed, a helicopter and a plane took off and the whole area was covered in a series of flights—but in vain. When everything possible had been done by helicopter, we conducted a search of all crevasses and mountain sides, but also in vain.

The most probable explanation, and I think the only one which is in accordance with all the evidence, seems to be that the two men had reached the camp on the ice cap early in the morning of July 20 and had rested there. They had been in the tent and had prepared food—most probably they had opened up the sledge and left it outside having taken only the Primus, the air mattresses, and so on with them into the tent. Something then happened which caused them to interrupt their meal and leave the camp in a hurry. Almost the only possible thing is that a sudden gust blew the sledge with the sleeping bags down the glacier; the wind was from south or south-east, and the sledge would then have disappeared towards the glacier descending to Inglefield fjord. The loss of the sleeping bags could be a serious handicap to the continuance of the expedition, and therefore the two men decided to try to get hold of the sleeping bags. They would try to find the bags on their way down to base camp and, if not, they would expect to reach the coast within two hours. They would only have taken time to secure the tent as quickly as possible, and would then have left the ice cap camp. They did not know, that they were shortly after to be caught in a quite phenomenal storm, and they must have decided to leave the normal route and to try to reach an alternative route over the rocks, which Holland had previously reconnoitered. But they never reached shelter. Their strength was not sufficient, whether because of the pain from bruises caused by falling on the ice or into crevasses, or because the weather was too hard for them, we shall never know. All that we know is, Michael Holland fell asleep on the ice, that Carsten Velsboe was with him to the last, and that after the death of his comrade Velsboe made an attempt to reach the base camp alone and did not succeed in getting home. Two good men have lost their lives—a Danish and a British geographer have died together in an attempt to secure information as part of the International Geophysical Year.

GEOGRAPHY IN THE SOVIET UNIVERSITIES

G. MELVYN HOWE

THIRTY OUT OF the thirty-three universities in the Soviet Union [1] have faculties of geography, but the inclusion of polytechnical and other institutes (pedagogical) like our teachers' training colleges brings the total to about sixty-five. Whereas the departments of geography in the British universities are normally in the faculty of arts or of social science—though occasionally in both the arts and science faculties—those in the Soviet universities come within the faculty of natural sciences, and in Moscow and Leningrad, at least, have a Dean and Council to direct their activities. Geography, as a subject of study in the U.S.S.R., is an undoubted science, and one which, in recent years, has made considerable advances in geographical teaching, in research, and in applied geography. The breadth and vigour of discussions on the concepts and methodology of geography and of field researches as revealed by Soviet geographical publications, and the number of professors, lecturers, research workers, students and geographical institutions bear witness to these developments.

After completing their period at the "ten-year school" at the age of about seventeen or eighteen years, students in the Soviet Union are eligible to attempt the entrance scholarship examination for the university. Older entries from factories are also encouraged, since, with the heavy demand for university places, some students complete factory apprenticeships first (during which time they may take correspondence courses). Persons over thirty-five years are not accepted as university students.

The successful candidate enters the university for a period of five years and is exempted from military service. The university year is divided into two terms—September 1–January 23 and February 7–June 1. This gives the student a total university career of some 45 months compared with the British average of 20 months. However, the first two years at the Soviet university, as in the United States, cover ground which in this country is covered during the final years at the grammar school.

By passing the entrance examination a student automatically qualifies for a scholarship out of which he pays his fees, board and lodgings. So long as he is successful at his regular six-monthly examination the student receives the full scholarship; a particularly brilliant student may well receive a bonus. Students' grants are increased according to merit and performance in the Soviet Union in contrast to Britain where grants are based on minimum subsistence requirements.

Students without accommodating relatives in the university town have to live in a student hostel (*obshchezhitiye*) where conditions tend to be somewhat crowded by Western standards. One room often provides living, sleeping and even cooking space for three or four students. In the new buildings of Moscow University, on the other hand, the residence block which provides accommodation for about 6000 out of the 18,000–20,000 students, compares very favourably with our provincial or non-residential universities. The rooms are small but contain all the essentials for two students. There is a washroom and shower for every two rooms.

The Komsomol or League of Young Communists provides the facilities of the Students' Union in British universities. It is a social as well as a political power among the Russian students and organizes lectures and discussions on political topics. Practically all students belong to the Komsomol and its chairman is certainly the most influential student at the University. It would appear that a good Komsomol record helps a student in later life, particularly if he wishes to become a member of

[1] Dr. Melvyn Howe, who is lecturer in geography at the University College of Wales, Aberystwyth, visited the Soviet Union in August 1956 on a travelling scholarship and grant awarded by his college. The visit was entirely non-political in character.

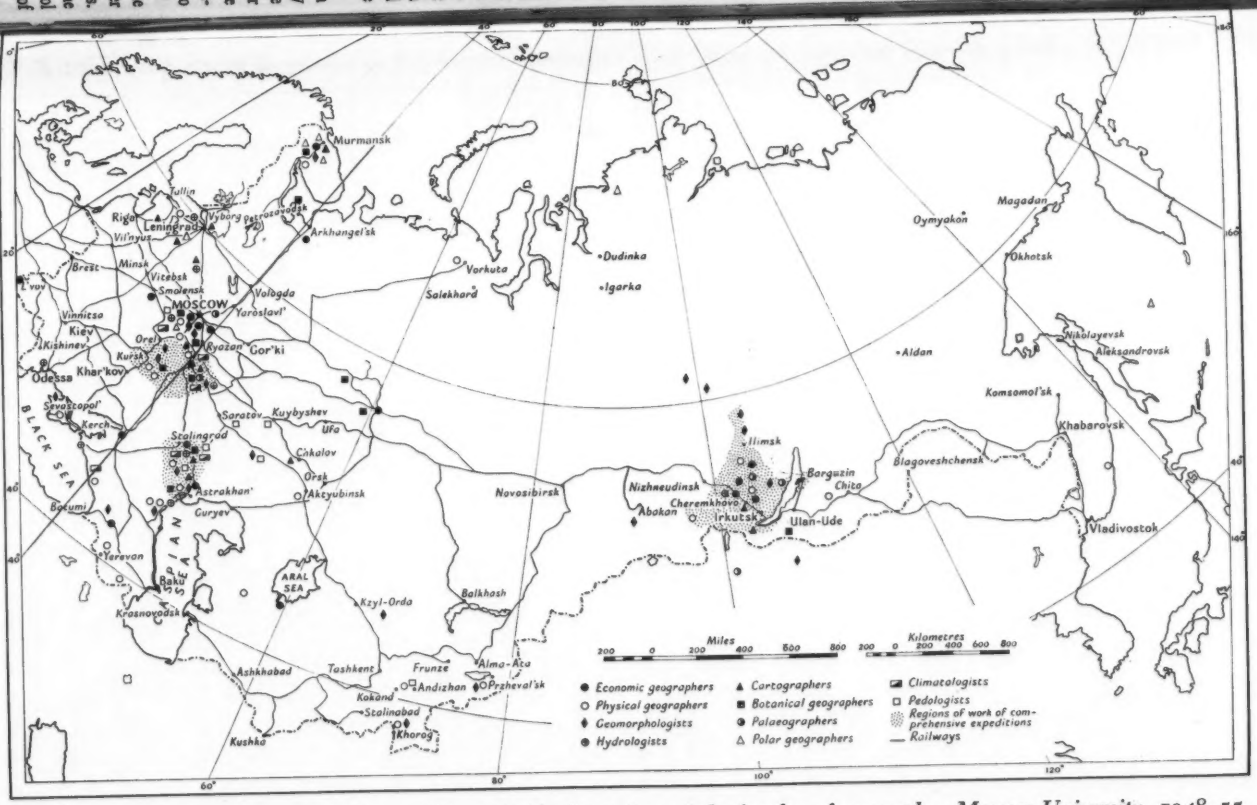


Fig. 1. Field researches by expeditions and by individual members of the faculty of geography, Moscow University, 1948–55
Adapted from 'Geography in Moscow University in the last 200 years' (in Russian), Moscow University, 1955

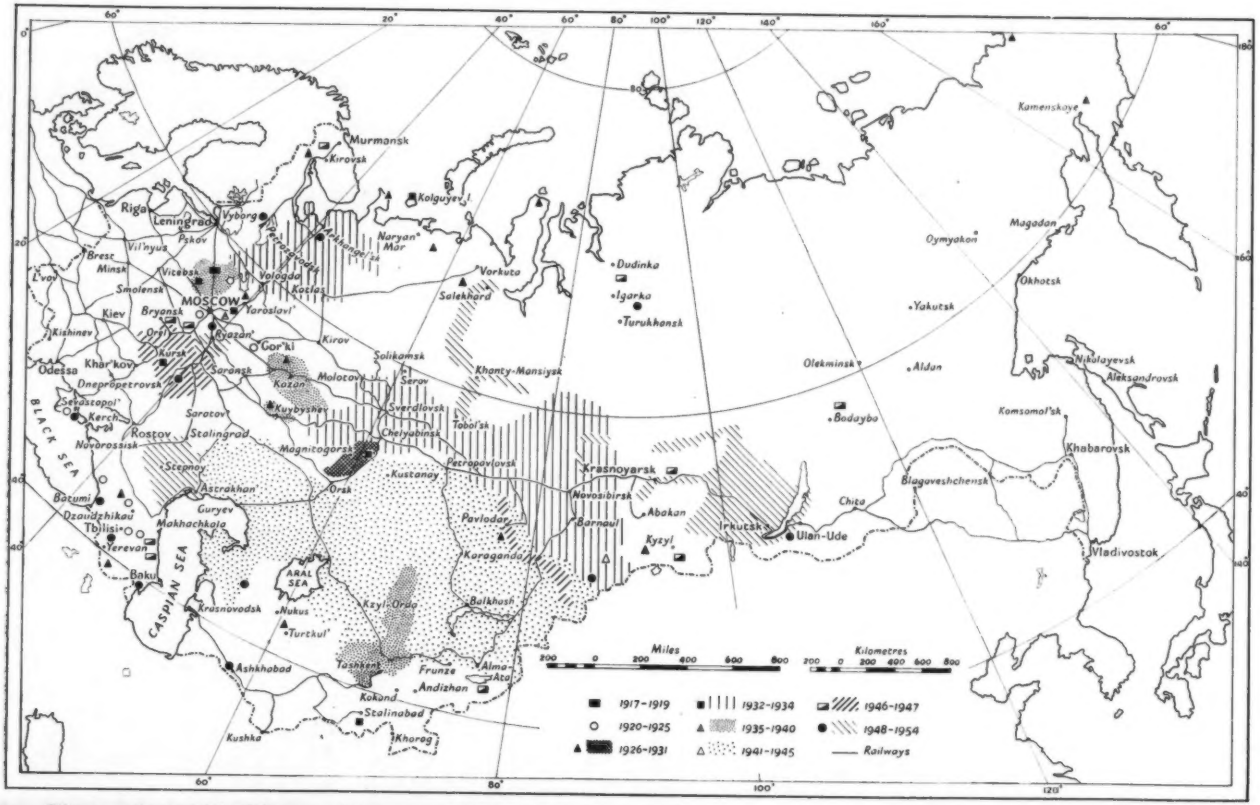


Fig. 2. Areas visited by expeditions and individual members of the faculty of geography, Moscow University, 1917–54

the Communist Party. Many mass movements of students to assist in projects in various undeveloped parts of the Soviet Union originate in *nem. con.* resolutions passed at Komsomol meetings. To refuse may well involve an individual student in criticism in the Komsomol paper or expulsion from the organization and perhaps even from the university.

In Moscow University the faculty of geography occupies six of the thirty-three floors of the imposing skyscraper university building on Lenin Hills on the outskirts of the city. It includes thirteen chairs, six in regional geography[1] and seven in systematic geography.[2] Each of the chairs is a veritable "school" or "department" and as with every well-equipped modern geographical institution there are laboratories, lecture theatres, classrooms, and study rooms. An impressive library occupies the "core" of the faculty and a wide range of standard geographical texts in English, French and German was observed. The Moscow faculty is looked upon as the supreme authority in geographical matters in the Soviet Union[3] and it is instructive to examine the scheme of study followed by its students.

First year

Courses are taken in general physical and economic geography, geology, physics, chemistry, mathematics and a foreign language. Marxism and Leninism, political economy and philosophy are compulsory for all university students from the first year onwards. The faculty has a "field centre" at Krasnovidovo on the outskirts of Moscow where first year students spend about one month under the guidance of assistant lecturers and demonstrators. The emphasis in first year fieldwork is on land surveying and mapping from aerial photographs (the photogrammetry department of the faculty was seen to possess an impressive array of Zeiss and Russian equipment).

Second year

The second year consists of general courses in physical geography (climatology, pedology, geomorphology, biogeography and oceanography) and the physical and economic geography of the Soviet Union and of the continents. These "systematic" and "regional" courses extend over five years, but beginning in the second year, the student gets additional instruction in a "specialism"—*e.g.* climatology, geomorphology, economic geography, etc. Specialists in climatology, for example, have courses in meteorology, physics and mathematics; those in geomorphology have courses in mineralogy, petrography, crystallography, structural geology, tectonics, hydrogeology, palaeogeography, Quaternary geology, erosional processes, etc. Students specializing in economic geography receive instruction in the geography of population, in agriculture, industry, transport, statistics, the principles of division into economic regions, the bases of planning, etc.

In the second year, fieldwork at Krasnovidovo "field centre" is more intensive than that of the first year and lasts for about two months. Each "specialism" has an elaborate course during which it would seem that the interrelationships of the various "specialisms" receive particular attention. The interaction of the several factors of the physical environment gives the "natural complex," which, in its turn, seemingly conditions the human geography.

[1] Physical geography of the U.S.S.R., economic geography of the U.S.S.R., physical geography of foreign countries, economic geography of foreign countries, geography of polar regions, and cartography.

[2] Geomorphology, climatology, biogeography, hydrology, oceanography, pedology and soil geography.

[3] Leningrad, however, is the oldest centre of geographical teaching and research in the U.S.S.R. The Leningrad faculty has eight chairs, physical geography, economic geography, geomorphology, hydrology, climatology, oceanography, cartography and biogeography. Leningrad is also the centre of the All-Union Geographical Society of the U.S.S.R.

Fig. 2. Areas visited by expeditions and individual members of the faculty of geography, Moscow University, 1917–54

The second year field work for some of the more specialized, and solely physical branches of the subject is as follows:

Meteorology.—Practical work at an "auxiliary" meteorological station in a small park near the university buildings. Here the students make weather observations and become acquainted with the method of producing daily weather charts and of making elementary weather forecasts. Variations in local and microclimates in relation to relief differences, vegetation cover, and proximity to bodies of water, are studied. Findings are analysed and correlated with the relief of the region to demonstrate relationships between local and micro-climates and individual facets of the landscape.

Hydrology.—Students receive instruction in the use of various hydrological instruments and undertake hydro-geographical studies. These latter involve detailed examination of the structure of river valleys, of catchment areas, of deltas and shore lines. Four or five days' practical instruction are also received on board a ship based on Odessa.

Pedology.—Identification and mapping of soil type is the primary aim of the field work. The differing conditions of soil formation on either bank of the Moscow river enable students to become fully acquainted with podzols, boggy, alluvial and other soils at various stages in their formation. Depending on the "specialism" of the individual student, emphasis in pedology is laid on the type of problem he is likely to meet. The student hydrologist studies the soils of a catchment area in relation to the water cycle, to porosity and permeability of strata, etc. The student concerned with polar investigations concentrates on boggy soils and associated problems. The relationships between soil type and species on the one hand and parent rock, relief, climate and vegetation on the other are studied in detail, the object being to demonstrate that soil is an integral part of the landscape.

Biogeography.—The vegetation cover is examined and described as an element of the geographical landscape. Divers types of vegetation are represented in the Moscow region—conifers, secondary birch woods, various grasses and also elements of the broad-leaved woodlands—and all receive special treatment. It seems that the emphasis rests on the distribution of plant associations and geo-botanical mapping, and the demonstration of interrelationships with other natural conditions.

Geomorphology.—General recognition-traverses across typical land forms and geological exposures under the guidance of the teaching staff enable students to become acquainted with varying geomorphological characteristics. These are followed by independent work by small groups of students involving the preparation of detailed geomorphological maps of parts of the local (Moscow) area. Profiles across the Moscow river are often included. Individual field notes and collected material are collated and related to relevant literature in the laboratory. Students specializing in geomorphology become acquainted in the field with Quaternary deposits of the Russian plain, with glacial, erosional and depositional land forms and contemporary processes of landscape formation. Geomorphologists also undertake geological-geomorphological fieldwork in the Crimea, the Caucasus and in the Khibin peninsula where, unlike the Moscow region, rugged mountainous conditions are experienced. Here, too, the stratigraphical succession of "solid," as distinct from "drift" deposits, and tectonics can be studied.

Third and fourth year

Courses in the physical and economical geography of the Soviet Union, of the People's Republics in Eastern Europe, and of foreign countries, are continued together with instruction in the chosen "specialism." Fieldwork during the third and fourth years lasts for several months each year and takes place in association with research expeditions in various parts of the Soviet Union. The geographer is often attached to expeditions composed of groups of scientists engaged in collecting and assembling data for a countrywide inventory on behalf of the State Planning Commission (Gosplan). This has been common practice since about 1948 (Fig. 1). At other times the expedi-

tions may be purely geographical and organized in conjunction with the Institute of Geography of the Academy of Sciences (Fig. 2).

Fifth year

About half of the year is devoted to a "specialism" and the preparation of the dissertation or thesis. The material for the latter is acquired on the research expeditions which may last as much as six months in the field. In expeditions composed of workers in various branches of science the geographer invariably functions as co-ordinator. It is he who is responsible for assembling and synthesizing the information gained and preparing maps for the final report. In this way geographers participate in the development of the new lands of Kazakhstan and Western Siberia, the reconnaissance of rivers like the Ob, Oka, Angara and Volga, the establishment and development of collective (*kholkoz*) and state (*sovkhoz*) farms, and of industrial enterprises.

The Russian geographer endeavours to express as much information as possible in map form and in doing so uses a wide range of conventional symbols. The present writer was able to examine many maps prepared by students of the faculty of geography, Moscow University, and was impressed with the generally high standard of cartography. Some maps, however, appeared unnecessarily complicated and overloaded with symbols and accompanying explanatory keys that were extremely detailed. The reports which the students are obliged to furnish serve, together with a written and oral examination, in support of candidature for the final diploma. Those students who do exceptionally well in the examinations get gold medals as prizes and are sometimes able to undertake post-graduate (*aspirantura*) research for the degree of "Candidate." This involves two and a half to three years' "internal" or "external" study and the presentation of a second thesis. A "Candidate" is virtually the equivalent of the Doctor of Philosophy degree of the British Universities. Ultimately there is the doctorate and the possibility of election to the Academy of Sciences, and this is comparable to the British D.SC., and F.R.S. respectively.

When the student finishes his course his qualifications and record are reviewed. He may do post-graduate work on the recommendation of a professor or tutor. "Pure" research is distinct from research linked with industry or social development, *i.e.* applied geography. Normally he is automatically drafted to a post related to some current requirement of the economic and planning authorities (Gosplan). He must stay in his first post for three years, after which he is free to transfer to any work he can find for himself. Invariably students are drafted to some of the great new projects that are being undertaken in the virgin lands of Siberia or in the Far North, *e.g.* the hydro-electric scheme at Bratsk (Irkutsk).

The students look upon such posts as obligatory repayment for the privileges they have received from the State. Men students are not liable for military service and they evidently prefer to undergo five years' study and to go where they are sent for three years, than to serve in the armed forces.

The Institute of Geography of the Academy of Sciences

Research in geography is not the prerogative of the universities. Certain of the more brilliant graduates join the staff of the Institute of Geography and undertake research within a programme prepared by a scientific council of experienced geographers. At present, the Institute, under the directorship of Professor Gerasimov, has over 250 research workers engaged on a wide range of topics. Physical geography, geomorphology, climatology and economic geography of the Soviet Union, have claimed most attention to date but the Institute is in constant evolution and there are departments actively engaged in research in biogeography, cartography, economic geography of the People's Democracies, and the geography of other foreign countries.

An important function of the Institute of Geography is the assembly of research

material for the State Planning Commission (Gosplan). This material is not published. The material that is published takes the form of regional monographs on, for example, the Crimea, Turkmenia, Moldavia, Georgia, Karelia, Lithuania. A total of twenty-four such general monographs is envisaged for use by a large public, to be supplemented, from time to time, by detailed monographs on special topics or by urban studies. The two departments of the Institute concerned with countries other than the U.S.S.R. are currently engaged in the preparation of geographical handbooks for the various countries of the globe.

In conclusion some observations on Soviet geographical thought may be of interest. Until 1927–8 human geography occupied a place in the geography faculty, but it was then superseded by economic geography, emphasizing Marxist principles. In the early 1930's there was a rift between the economic geographers and the physical geographers. The leftist "possibilist" economic geographers rebelled against the supporters of bourgeois "vulgar geographism" (physical determinism) whom they said were "conducting a harmful campaign against the appreciation of conditions in a socialist society." The "possibilists" claimed that physical determinism was useless, and advocated instead economic geography, which was stated to be the "learning of the schemes of sociological change as an expression of physical geography." Differences were not reconciled until 16 May 1934 when the Central Committee of the Communist Party was obliged to publish a decree in *Pravda* which gave support to the physical determinists. *Pravda* criticized the inadequacy of geographical teaching in which economic and political factors received greater emphasis than the purely geographical controls. This development in Soviet geographical philosophy was a complete reversal of tendencies observed in the teaching of other sciences in the U.S.S.R. Economic geographers (the "possibilists" with their Marxist principles) were probably considered too close to the views of Western geographers, for it is the "determinists" who now hold sway in Soviet geographical thought.

Acknowledgements:—The writer wishes to acknowledge the kindness with which he was received by Professor Markov, Dean of the Geography Faculty, Moscow University, Professors Korchagin and Chetyrkin of the Geography Faculty, University of Leningrad, and Professor Avsiuk, Assistant Director of the Institute of Geography, Academy of Sciences of the U.S.S.R. He is also indebted to Dr. N. Rast of the Department of Geology, University College of Wales, for generous assistance in translating Russian.

A MODERN SLEDGING RATION

H. E. LEWIS AND J. P. MASTERTON

SLEDGING RATIONS ON Polar expeditions have been relatively unchanged since Watkins evolved a very workable and apparently adequate one for his British Arctic Air Route Expedition of 1930–1 (Chapman, 1932). This ration is shown in Table I. With a few modifications, it is the one taken by most Polar wintering parties and is exemplified by the one taken on the British North Greenland Expedition 1952–4 (Simpson, 1957). This ration is shown in Table II.

TABLE I

British Arctic Air Route Expedition 1930–31. *Sledging ration—1 man day*

	Weight (oz)	*Calories*
Pemmican	8	1272
Margarine	8	1808
Biscuits	4	516
Pea flour	2	156
Plasmon powder (as milk powder)	2	300
Plasmon oats	3	345
Sugar	4	448
Cocoa	1	128
Milk chocolate	3	492
Horlicks	0·5	57
	35·5	5522

Plus:
Cod liver oil
Dried yeast powder
Lime juice
Essential salts

On this latter expedition we investigated the nutritional balance of the men as part of the physiological programme sponsored by the Medical Research Council (Masterton, Lewis and Widdowson, 1957). The standard ration supplied 4200 calories per man per day, but it was found that, during the observed periods, men sledging and given unlimited food ate 4800 calories. At the same time we assessed the actual work done, and from this calculated the energy expenditure. It was found that this figure was almost identical with 4800 calories, *viz.* the amount of food eaten. This nutritional balance is very important for the health and efficiency of the men and should not be even slightly upset by too small a food intake. Over many months it could result in slow starvation.

The apparent inadequacy of the standard sledging ration led us to realize that use had not been made of the many advances in food and packaging technology since the war. Appreciating this, the Climatic Physiology Committee of the Medical Research Council suggested that a modern ration be evolved to provide about 4800 calories and packed in such a way that, in spite of the extra calories, the weight, including all containers, should be comparable with that of the standard ration.

Through the Institute of Packaging we were put into contact with members of

TABLE II

British North Greenland Expedition 1952–4. Sledging ration—1 man day

	Weight (oz)	*Calories*
Pemmican	5·6	890
Butter	5·6	1261
Potato powder	1·6	174
Cocoa	0·4	51
Chocolate	2·4	392
Sugar	3·0	339
Rolled oats	2·3	264
Dried milk	1·6	238
Biscuits	4·3	555
	26·8	4164

Weight of 20 man day box =45 lb gross
Weight of packing+box =12 lb
Weight of ration =33 lb
Ratio of ration: gross weight =33 : 45
=1 : 1·4

the Research Division of The Metal Box Company, who spared no efforts in helping the project. Similarly, several large food organizations advised and presented rations for experiment. In November 1956 our first prototype was ready, and twenty man-day boxes were sent for trial on the Commonwealth Trans-Antarctic Expedition, and with the Royal Society I.G.Y. party at Halley Bay, and units of the Falkland Islands Dependencies Survey. Preliminary radio messages have been encouraging, and when the expeditions return we will be able to analyse their detailed reports. We hope to develop this ration as an alternative to the well-established one, hoping it may prove useful to future expeditions. Table III gives an estimate of the caloric value of the new ration and Table IV compares it with the British North Greenland Expedition Ration.

The first prototype was packed in the same wooden box (twenty man-day) as the standard F.I.D.S. ration. Within the box is a large, thick polythene envelope in which all the separate packages are contained. This envelope has a large sleeve which can be folded over after initial opening and so prevent drift entering. The ration itself is divided into ten packages which each contain food for two men for one day, excluding one or two items which are packed in individual one- or two-man packs of polythene or foil which have been substituted for tins. In the standard ration these tins have to be retained until the end of the twenty man-day period, and therefore constitute a dead weight. In the new ration—unit packaging with disposable daily wrappings—the weight loss per day is comparatively greater, viz., 9·2 per cent. instead of 7·5 per cent. In the first prototype, however, the initial gross weight is greater than that of the standard ration. In the second prototype this is being corrected by reducing the weight of the outer box, and slightly reducing the weight of food but maintaining the calories value of 4800.

We are now trying new types of outer box and are investigating such materials as fibre-glass, vulcanized fibre, plywood banded with aluminium, and plastic. A full range has been used for the rations of the International Physiological Expedition to the Antarctic. This expedition is a joint British-American venture and made contact with the Commonwealth Trans-Antarctic Expedition in the field. Every prototype has an extensive questionnaire for information about the effect of low temperatures,

TABLE III

Medical Research Council 1st Prototype Ration. Sledging ration—1 man day

	Weight (oz)	*Calories*
Meat bar	5	810
Butter	4	900
Potato block	0·5	78
Cocoa	0·75	96
Chocolate	4	656
Sugar	3	336
Rolled oats or oatmeal bar	2·5	314
Dried milk	1·75	263
Biscuits	4	556
Soup powder	1·25	125
Dried onions	0·5	—
Tea powder	0·17	—
Salt	0·08	—
Cheese	1	145
Nescafé	0·06	96
Marmite	0·1	—
Complan	1·5	190
Sweets	2	224
	32·16	4789
Extras for 20 man days:		
Sultanas	8	568
Sherbet	8	448
Steak and onions	8	320
Steak and kidney	8	520
Jam and marmalade	3	222
Milo milk drink	3	384
	38	2462
I.e. Extras/man/day	1·9	123
=Total/man/day	34·06	4912

Total weight of 20 man box =57 lb gross
Weight of packing+box =14·4 lb
Weight of ration =42·6 lb
Ratio of ration : gross weight =42·6 : 57
=1 : 1·33

TABLE IV

Comparison between British North Greenland Ration and New Ration

	B.N.G.E. ration	*New ration*
Weight of food/man/day	26·8 oz	34·06 oz
Calories/man/day	4164	4912
Gross weight of 20 man box	45 lb	57 lb

damage to the box under conditions of dropping or immersion in water, the packaging, variety and quality of the foods. Other comments will be welcomed from the users, and it is hoped that the third prototype will embody many improvements.

Summary.—A new sledging ration, yielding 4800 cal/man/day is presented. It embodies many advances in food and packaging technology, such as unit wrappings of disposable polythene and aluminium foil. It is hoped that, with further modification, it may prove a substitute for the present standard sledging ration.

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FROM THE *JOURNAL* A HUNDRED YEARS AGO

THE FOLLOWING extract is taken from a note, condensed from the Danish by Dr. Shaw, "On the supposed Discovery, by Dr. E. K. Kane, U.S.N., of the North Coast of Greenland, and of an Open Polar Sea, etc.; as described in 'Arctic Explorations in the years 1853, 1854, 1855.' By Dr. Henry Rink, M.D., Inspector in Greenland for the Danish Government." It was read to the Society on 12 April 1858, and is printed in the *Journal of the Royal Geographical Society*, Vol. 28, p. 273.

. . . "It is well known that the active and undaunted American traveller, Dr. Kane, unfortunately so early carried off, attempted, in the year 1853, to go farther north up Smith Sound, than Captain Inglefield, the year previously, had done; but that he only succeeded in taking his ship a trifling distance farther than Inglefield; that he was then frozen in, lost his ship, and in the year 1855 saved himself and party by returning, in boats, to the Danish colony of Upernivik. From his two years' winter quarters in Van Rensselaer Bay, on the east side of the Sound, he, by the help of dog and drag sledges, undertook expeditions in different directions, partly across to the American side, but mainly along the coast, pursuing it northward, to find, if possible, the northern end of Greenland.

What was discovered on these tours must be regarded as the real profit of the expedition, and I will here confine myself to the two points which have cast the chief lustre over the expedition. *First*, that which concerns the unknown interior of Greenland, the glaciers and floating icebergs that issue thence, about which the author expresses himself on occasion of having discovered a glacier on the coast of Greenland, between 79° and 80° N. lat., to which he has given the name of Humboldt. *Secondly*, a sledge expedition undertaken by Morton (one of the ship's crew who it seems was steward), in conjunction with Hans, a Greenlander from Fiskernaesset; whereby they are said to have come to the margin of an *open* sea, which is presumed to occupy the whole region around the North Pole, and to be kept open by a branch of the Gulf-stream; and besides this, to have discovered the most northern lands on our globe, which, according to their description, are likewise laid down on the chart and called 'Victoria and Albert,' 'Washington,' etc., Lands."

Dr. Rink goes on (pp. 283–4) to demolish Kane's claim to have discovered anything new in the interior of Greenland, and then disposes yet more drastically of the idea of an "Open Polar Sea." Morton's own account ending with " . . . as it was impossible to get around the cape I retraced my steps," Rink concludes:—

"With this, the exploration of the open Polar Sea, and the farthest lands on our globe, was ended. Morton felt himself disappointed in not being able to come past that terrible Cape, which hid his prospect towards the east. I, for my part, was not disappointed on reading that such a hindrance arose before him. I know it from sad experience, as I, during three consecutive winters, have followed the winding coasts of North Greenland in dog sledges, in order to lay them down on my chart. I know these bewitched points which continue to shoot forth when one thinks one is at the end of an island, these endless promontories which one must come past before one can reach the right promontory, and can turn round; these hills—these eternal tops—that shoot up when one ascends the cliffs, before one reaches the right top, whence one can have the wished-for prospect. I have passed half a day thus only to get the wished-for general view over one single fiord-arm, and that even sometimes in vain. What must it then not be, when one on an afternoon, and on foot, seeks to reach the unknown end, to use Kane's own words, of a 'whole little Continent'? "

THE RISE OF THE POLAR HERO

SHACKLETON. By MARGERY AND JAMES FISHER. *London: James Barrie*, 1957. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xvi + 559 *pages; maps, plates.* 30*s*

THIS MASSIVE BIOGRAPHY of a great polar leader was published to coincide, more or less, with the departure of Dr. Fuchs' Trans-Antarctic Expedition in 1957 from Shackleton Base in the Weddell Sea. It was a well-founded association, for Fuchs' plan was geographically Shackleton's plan for his Imperial Trans-Antarctic Expedition, the most audacious of all his many projects, which set out for the Antarctic, to cross the continent by land, on the eve of the First World War. With few of the resources and none of the multifarious technological aids available to the polar explorer today, Shackleton's project was condemned as ill-considered and foolhardy by many professional critics. Among the general public, however, Shackleton found ample support. To that new phenomenon of the day, the "man in the street," he had become the epitome of romance and daring and the very audacity of this new project had an immediate appeal. The expedition, it is true, was a failure. But it was a glorious failure, made memorable by great personal achievements of courage, of endurance, and of leadership; achievements of the kind which have so justly given to this era of polar exploration the title "The Heroic Age."

This stage in the evolution of Antarctic exploration is most rewarding when it is studied in relation to the social and cultural life of the time, that is to say, of the nineties and the early years of the twentieth century. Indeed, only in this context is it possible to perceive how the legend of the Heroic Age came to be created. The period was a renascent one, marked by a great quickening of the imagination. It was an era of hope and of action. It was also characterized, perhaps because of a certain nihilism born of that growing sense of personal constriction which appears so often to be the concomitant of technological progress, by a hunger for vicarious sensation, for romance by proxy, which writers of current fiction and even more important the journalism of the new "Yellow Press" stimulated, exploited and fulfilled.

In literature these popular needs were met by a flood of romantic fiction; the works, for example, of Rider Haggard, of Robert Louis Stevenson, of Joseph Conrad; the new romances of science from the pen of H. G. Wells; and, most of all, the writings of Rudyard Kipling, whose panegyrics of the British pioneer, pitting himself against nature or against barbarism at the ends of the earth, recalled to those then suffering from an overdose of *fin de siècle* the refreshing spirit of Elizabethan days. But even more important, and especially important in the development of exploration, was the way in which this hunger for vicarious sensation was catered for by the new, cheap and popular newspapers like the *Daily Mail* which, because of a nation-wide circulation never before attempted or achieved, could now bring sensation and romance to every corner of an increasingly urbanized, industrialized and bureaucratic land; a land in which the personality of the individual man was in daily danger of becoming submerged in the dreariness of a monotonous uniformity.

Alfred Harmsworth was the Fleet Street genius who brought about this journalistic revolution. He borrowed a good deal of the new technique from the United States and it is interesting to recall, in connection with the serialization in his new enterprise, the *Daily Mail*, of stories of polar adventure, that the *New York Herald* many years before had been first among newspapers in the United States to exploit for the excitement of its readers the romance of travel and exploration. Harmsworth had himself already sponsored an Arctic expedition which, in the astonishing meeting between its leader Jackson and Nansen, gave the world a story almost as dramatic as the *Herald's* Stanley-Livingstone "scoop." The revival of Antarctic exploration at the turn of the century, in which the Society through Sir Clements Markham played a considerable

part, provided a new source of stories of adventure for the Yellow Press, and Harmsworth, who became closely associated with Scott's first expedition as well as with those of Shackleton, was quick to take advantage of it. In doing so, he played a considerable part in projecting to an increasingly enthusiastic public the picture of Antarctica's Heroic Age.

At first sight, these may seem somewhat academic considerations in relation to the book under review. But in fact they had a considerable practical effect on the direction which Antarctic exploration was to take during the first quarter of the twentieth century because this new development of the nation-wide newspaper coincided with another new phenomenon, the emergence of the privately organized expedition, which now had to rely for the most part, not as formerly on support from governments, but on public and private subscriptions, which depended in turn on the stimulation of public interest. Here the newspapers played a dual role. With their new mass circulation they came to be in a powerful position to stimulate both public interest and support. In addition, they were able to provide large subscriptions to expeditions in return for exclusive articles, if these seemed likely to give their reading public what it wanted, which was adventure and not research.

To Shackleton, this was no inconvenience. He was himself the adventurer *par excellence*, a man who, as Mill said in his earlier biography, would have been just as happy seeking buried treasure in the Pacific as he was to be among the excitements of Antarctic discovery. Shackleton had no personal interest in science—for him geology, we are told, was a matter of precious stones—but to the more scientifically-minded explorer, as Scott was, this new influence must often have been an embarrassment since it could force the promoter of an expedition in search of funds to place undue emphasis on the adventurous side of exploration, on record-breaking journeys, on dashes to the Pole, rather than on less sensational scientific work.

The nineties, it has been said, were "a decade pre-eminently of the magazine supermen." So it was in the early years of the twentieth century. The newspaper, like the magazine story, must have its hero, and the building up and projection of the heroic personality of the polar leader became an inevitable accompaniment of this new polar publicity. The polar leader could now become overnight a national figure, a symbol at once of national achievement and personal enterprise (in the Kipling sense), a dream figure with whom the millions condemned to a smoke-laden city life could happily identify themselves. In the eighteenth century, the immediate public reaction after Cook's first expedition was excitement not about the adventures of Cook and his men but about the curious and diverting discoveries of the scientists, Solander, Banks and the astronomer, "the ingenious Mr. Greene." Through most, at any rate, of the nineteenth century the personality of the leader tended to be submerged in the glorious but anonymous epic of the Navy. The cult of the polar hero which grew up towards the turn of the century was a new idea and an intriguing development in the social history of exploration.

Those who read this story of Shackleton's life will see at once how completely Shackleton must have fulfilled the popular conception of what an heroic explorer should be. Indeed, in those pages of the book which describe his Antarctic adventures, he emerges as a man of truly heroic proportions and, whatever may have been his shortcomings as a leader of a scientific expedition, as a planner, or as an administrator, he emerges above all as a great leader of men. But this is a judiciously balanced study, and another, less noble side, can also be seen; that of the egotist, of the ambitious self-seeker who saw in Antarctic exploration a short cut to fame and fortune, that of the gambler who was forever dabbling in doubtful financial schemes. These were, perhaps, the characteristics which aroused some mistrust of him in geographical circles though it must be admitted that this did not make critics like Sir Clements Markham and his followers any the less anxious to bask in Shackleton's reflected glory. It is very curious, this dichotomy in Shackleton's character, and it is illustrated by his different behaviour at home and in the field. At home, he appeared unable—

indeed, he often confessed it—to get on terms with the complexities of civilized life and only in the devotion of a very remarkable wife does he seem to have found some stability. But in the Antarctic, it was different. There, amidst the perils and rigours of an explorer's life, he found freedom from the strains and stresses which were the results perhaps of some inner psychological conflict. Only in the Antarctic was Shackleton the whole man.

In presenting this massive biography, Mrs. Fisher and her husband (whose chief contribution has been to collect by tape-recorder the reminiscences of all those who knew Shackleton) have made a valuable contribution to Antarctic history. Much new correspondence, inaccessible to or unusable by Hugh Robert Mill in his 'Life,' is now made available and for this ample documentation, as well as for the objective way in which it is used by the authors, the specialist will be grateful. From the point of view of the general reader, there is perhaps too much attention to technical detail and to the pros and cons of a multitude of minor technical problems. This tends to obscure the broad picture and sometimes to break the flow of the story. But these are minor disadvantages in a book valuable both as an account of a great traveller in a great age of Antarctic exploration, and as a detailed portrait of a fascinating man.

L. P. KIRWAN

THE MARSHMEN OF SOUTHERN IRAQ

A REED SHAKEN BY THE WIND. By GAVIN MAXWELL. *London: Longmans, Green*, 1957. $5\frac{1}{2} \times 8\frac{1}{2}$ *inches; 224 pages; sketch-map and illustrations.* 21*s*

THE GREAT SWAMP of southern Iraq is formed: to the south of Amara town by the flood waters drawn off from the Tigris by six principal canals, Butaira, Majarr as-Saghir and Majarr al-Kabir on the right bank (central marsh); Musharrah, Chahala and Michariya on the left (eastern marsh); and to the east of Suq ash-Shuyukh by the overflow of the Euphrates (southern marsh). On the banks of the rivers and the great canals near their heads there are narrow belts suitable for gardens or the winter crops of wheat and barley; the lower lands towards the tails are submerged by the spring floods, and it is here that rice and other irrigated summer crops are cultivated as the waters recede; beyond these is the area of permanent marsh where the economy is based on the buffalo. The rice cultivators and the marshmen proper, the Ma'dan, live on the whole very much the same kind of life. The central and eastern marshes are situated for the most part in the *liwa* of Amara, the southern in Muntafik; all three overlap into Basra.

In Turkish times the whole of Amara, except a few properties near the river, was the personal domain of the Sultan and was administered by a special department. The rice lands were divided into a number of large estates which, with the adjoining areas of permanent marsh, were let out on short lease to shaikhs of the principal tribes: Azairij on the lower Butaira and Majarr as-Saghir, Albu Muhammad on Majarr al-Kabir, the Chahala and the Michariya, Suwa'id on the Musharrah, and one or two others. The shaikh-lessees were responsible for law and order within their boundaries, the construction of dams and dykes and the distribution of water for irrigation. The Ma'dan tribes like the Shadda (reckoned to be a section of Albu Muhammad and descended from the same ancestor), Shaghanba, Faraijat and Fartus, held no direct leases; administratively they were thus subordinate to the big rice-shaikhs. The system of short leases made the individual lessee vulnerable to Government displeasure (though any change would have to be within the ruling family) and militated against any planned improvement. In 1915 the British military administration initiated a policy of giving long leases but cautiously dividing the

estates where considerations of water control permitted; the process of fragmentation has been continued by the Iraqi Government.

It has been said that it takes two people to write a really good book of travel, a newcomer to give the fresh, vivid impressions and an old hand to interpret the true significance of things seen and heard. If 'A reed shaken by the wind' does not quite come up to this specification, it comes very near. Mr. Maxwell is a practised traveller and writer whose earlier book on Sicily has won high praise; he is a naturalist and a lover of animals; he came to the marshes of Iraq with the intention of writing about them and was thus unlikely to overlook anything that could give interest to the record. Added to this he had the good fortune to travel with, and under the auspices of, Mr. Wilfred Thesiger, whose recently published papers and photographs [1] have established his reputation as the leading authority on this most interesting region.

The journey described in this book was made in the spring and seems to have lasted about six weeks, the time being divided fairly equally between the permanent and the seasonal marsh and between the two sides of the Tigris. The route can be followed on the sketch-map, which is adequate for this purpose. The author has made the most of his opportunity. A remarkable command of language and a faithful visual memory have combined to present a brilliant picture of the landscape and the society of the Great Swamp. The island villages; the great vaulted guest-houses with their lofty arches of giant reeds, always so reminiscent of a cathedral; within, at night, the lines of faces "lit only by the wildly flickering fire of reeds"; the "demoniac rhythm" of a "tiny whirlwind scrap of humanity" dancing, with the encore, for forty minutes on end (a particularly memorable piece of descriptive writing this); the "open blue lagoons fringed and islanded with golden reeds growing dense and twenty feet high"; "duck and coot whirling down the wind like leaves in an autumn gale"; "flights of pelicans sailing majestically by"; the "rich and placid leisure" of the buffalo's existence; the stealthy intensity of a pig hunt among the reeds; the "tumultuous voices of millions of frogs"; the colours of sunset; and "far away, where sky and water meet" the high-prowed canoes "forming etched silhouettes of infinite delicacy"; —these and other sights and sounds of the Swamp are vividly evoked.

Travelling with Mr. Thesiger is evidently no feather-bed affair, and the author did well to emerge sound in wind and limb if a trifle bruised in spirit. Readers who know their Middle East may think that he dwells excessively, and sometimes rather naïvely, on the less pleasant side of his experiences among a people whose guest he was for most of the time: most novices would prefer the discomforts of a canoe to those of a camel; if disease and deformity are common, old residents will remember that magnificent body of men, the 1st Marsh Arab Battalion of the Iraq Levies, later the 7th Battalion of the Iraqi Army, of whom a British officer has recorded that not a man in his company measured under 6 feet; away from modern European influences sanitary arrangements are extremely crude almost everywhere, but most travellers have been content to take them for granted.

Good wine needs no bush, and it is a pity that the author should have succumbed to the temptation to claim that the journey he has described so well was through an almost unexplored land about which only two other Europeans know anything very much. (Even Thesiger himself has made no such claim; what is unique in Thesiger's achievement is that he has lived for months on end among the ordinary Ma'dan as one of themselves, doctoring them and sharing in their joyful and sorrowful occasions, so that he is known there from one end to the other and sure of a welcome wherever he may elect to tie up his canoe.) Illusions of this kind are particularly dangerous for any part of Iraq. For seventeen years, from 1915 to 1932, members of a British service with a strong tradition of proficiency in Arabic (not the kind that is "learnt in a week") and constant touring had direct responsibilities here, first as administering political officers and then, under the Mandate, as inspectors; and of course the

[1] *Journal of the Royal Central Asian Society*, 41 (1954, Jan.) pp. 4–25; *Geogr. J.* 120 (1954) pp. 272–8; *Illustrated London News*, 19 Feb. 1955 and 14 Jan. 1956.

Irrigation Department and recruiting officers were always closely interested. More recently, between 1941 and 1945, British political liaison officers no less enterprising than their predecessors were posted to various provinces, including Amara, to cooperate with the Iraqi administration for the joint war effort in the economic sphere.

What is true is that before the appearance of Mr. Thesiger's recent papers comparatively little had been published about the marshes in a form easily accessible to the general reading public. There is a collection of delightful sketches and anecdotes by S. E. Hedgcock and his wife (Fulanain) entitled 'Hajji Rikkan Marsh Arab' which appeared in 1927, went into two editions in the American version, and has been translated into German and Braille; Hedgcock had served for three years as a political officer at Qal'at Salih and Amara and knew his district well. Another book devoted entirely to life in the marshes is 'The Blood Feud' (1937), a novel by C. E. Corry, who served at Amara and for six years as Inspecting Officer of Police in Muntafik; the book makes no pretence to literary excellence but shows a profound understanding of the customs and mental processes of the Marsh Arabs. Shorter accounts are to be found in other books of travel such as 'Meet the Arab' (1947) by J. van Ess, the American missionary, who toured extensively in Muntafik before 1914 and made a reconnaissance for Sir William Willcocks across the central marsh from the Euphrates to the Tigris. Mention may also be made of articles in the *Indian Antiquary* of 1921 by P. A. Buxton and V. H. W. Dowson, and in the *Journal* of the Royal Central Asian Society, 34 (1947) pt. 1, by Lady Drower, whose other publications on the Mandaeans or Sabaeans, the silversmiths and canoe builders, also touch upon life in the marshes. A little research would no doubt trace others.[1] Many valuable reports (including some by Dowson, a frequent visitor between 1917 and 1947), must be mouldering in the cellars of the old Ministry of the Interior at Baghdad, but these are probably lost irretrievably.

Nor is the map quite such a blank as the author seems to suggest. The 1 : 253,440 Amara sheet of 1942 shows in the central sector the names of the principal channels through the high reeds and numerous open lagoons and islands, including all eight of the place-names mentioned in the book as situated in the area of permanent inundation. To the east of the Tigris the survey was not carried very far beyond the tails of the canals, it is true, but the line of islands from Abu Sukhair to Dibin and the northern Baidha is well known to those who have had much to do with the administration. To the north-east of this line the Haur al-Huwaiza, shown as unsurveyed marsh, is a vast expanse of open water where it can be very rough and even the Ma'dan do not care to venture in their light canoes; most people, like the author, have preferred to skirt it on the west and north, or like A. T. Wilson in 1914 on the east, just in Persia, but that hardly makes it a separate "lake unmarked on any map."

'A reed shaken by the wind' is none the less a very welcome addition to the scanty literature of the marshes of Iraq. The author's decision to dispense with an index is to be regretted, for the book contains much interesting information of documentary value. The illustrations are excellent and well chosen.

C. J. EDMONDS

[1] An excellent description of a town in the central marsh will be found in the chapter entitled "Children of the reeds" of Lady Drower's (E. S. Stevens) early book, 'By Tigris and Euphrates,' 1923.

REVIEWS

EUROPE

HISTORY ON THE GROUND. By MAURICE BERESFORD. *London: Lutterworth Press*, 1957. 9×6½ *inches*; 256 *pages*; *plates*, *figures*. 37*s* 6*d*

Mr. Beresford has already made a name for himself as a leader in the new school of "open air" historians who have begun to employ many of the methods of field archaeology to study the realities which lie behind the early records of rural and urban life in England. It is surprising that it has taken historians so long to reach this point, but the acceptance of the new techniques has obviously depended on the full demonstration of their validity for archaeology through Pitt-Rivers, the late O. G. S. Crawford and Sir Mortimer Wheeler.

Careful inspection and interpretation of surface signs, selective excavation, and the use of air photography to give a wider view of the significance of detail and to reveal things not readily visible on the ground are now becoming as much the regular practice in some fields of historical work as with the archaeologist. The records of this new approach can be very rewarding, as Mr. Beresford has already shown in his pioneer work on deserted and decayed villages.

In this book he now writes for readers who are not specialists with the aim of tempting others into a fascinating field of enquiry. The surface of England is so indelibly marked by a myriad traces of its past that opportunities for work of this kind lie at everyone's back door. The book contains six studies, and in each case the evidence of documents and of early manuscript maps and plans is brought to bear on selected towns and villages in the light of a thorough examination of their features on the ground.

Much use is made of the splendid series of maps of estates belonging to All Souls College which was prepared in the late sixteenth century at the instance of Warden Robert Hovenden. The first study treats of boundaries, and others deal with the changing fortunes of villages, the development of small market towns, and the vicissitudes of certain new towns founded in the Middle Ages, particularly Hedon, Ravenserod, and Hull upon Humberside. There is also a valuable chapter on the English park. This is a most readable book which carries a weight of learning lightly, and as such it is an admirable introduction to this new field of historical research. The illustrations are numerous and well chosen.

C. W. PHILLIPS

A SURVEY OF THE AGRICULTURE OF KENT. By G. H. GARRAD. *London: Royal Agricultural Society of England*, 1955. 10×7½ *inches*; 232 *pages*. 21*s*

The author has produced the pioneer volume of a series planned by the Royal Agricultural Society, and it is to be hoped that the volumes on other counties will follow without undue delay. Mr. Garrad has displayed the intimate knowledge of Kent and its agriculture which he has gained over some years at Wye College. The book is written in an easy style and is devoid of the many unexplained technicalities which often appear in such works. In the introduction, a comparison is made with earlier surveys of the agriculture of the county from John Boys 'General view of the agriculture of Kent (1796)' to that classic of the Weald, 'Agriculture and soils of Kent, Surrey and Sussex' by Hall and Russell (1911) and the later memoir in the 'Land of Britain' series published by the Land Utilisation Survey.

The stage is set in traditional manner with a description of the geology of the county and a summary of size of holdings, rents, water supply, etc. This introductory material is concluded with a map of land use regions reproduced from the Land Utilisation Survey memoir. The chapters which follow deal with agriculture in relation to geology and soils and provide a valuable summary, on a semi-regional

basis, into which is written a deal of material not easily obtained elsewhere. The description of Romney Marsh and its changing agriculture, especially since the agricultural depression of the early thirties, is particularly interesting. The second half of the book is full of details concerning the various aspects of agriculture such as hop growing, fruit growing and the several branches of the livestock industry. Here we find a most interesting survey of the changes brought about by, and the degree of, mechanization in Kent's agriculture. Brief accounts of agricultural education and research and of the county associations conclude the text, and there is a useful bibliography. The book is illustrated by well reproduced photographs, by a number of maps (several of which lack a scale), and by tabulated statistics.

One hopes that the Society will be able to find equally competent authors for other counties and that the series will not be left incomplete, for this initial volume contains much of interest to geographers. As is to be expected, the treatment is not entirely geographical, but what geographer could write a similar work that would satisfy his colleagues in both geography and agriculture? We are indeed grateful for a fund of knowledge presented in a manner which makes this work a valuable source book to the geographer, who is left asking for more! The most serious criticism is the absence of documentation, and perhaps one may appeal for this to be set right in future volumes. As an example, there is no reference to the source of the acreages of hops in 1835. H. C. K. HENDERSON

TAINE'S NOTES ON ENGLAND. Translated with an introduction by EDWARD HYAMS. *London: Thames and Hudson*, 1957. 8½×6 *inches;* xxxi+293 *pages; illustrations.* 25*s*

Hippolyte Taine (1828–93), the famous French philosopher and critic, published his 'Notes sur l'Angleterre' in 1871 after three visits to England in 1859, 1862 and 1871. These 'Notes' have now been fully and excellently translated by Edward Hyams, who also gives us a short life of Taine in his introduction. Taine writes primarily for his own countrymen. His purpose is to describe and explain the people of England and to contrast their habits and characteristics with those of the French. He is an observer both acute and sympathetic, placed midway, as it were, between the photographer and the painter; he presents facts and statistics, but the personality of the man, ever alert, humane and politely inquisitive, stands forth for all to see.

He is more impressed by our administrative efficiency than by our artistic sensibility. Thus he compares Paris and London respectively to Athens and to Rome, and comments much more favourably on the running of the British Museum library than on the arrangement of the Crystal Palace grounds at Sydenham. As a foreigner, he gives us fascinating glimpses of detail, which a contemporary Englishman would take for granted. He mentions, for example, the chained bibles at railway stations, the quill pens put out for readers at the British Museum, and the regulation prohibiting beggars in rags from entering St. James's Park. He is shocked and indignant at the squalor and destitution then rife in London, but what horrifies him, as a Frenchman, perhaps most of all, is the frequent sight of beggars forced to wear cast-off clothes that had passed through several hands since leaving the original owners. This, as he says, was intolerably humiliating; in France, even the poorest wore their own clothes, shabby though they might be.

Taine admires certain aspects of public school education. He visited Eton and Harrow, and was pleased to find a maximum of eight hours' work a day, compared to eleven in a French *lycée*. He approved of the emphasis on outdoor sport, but at the same time was surprised and appalled to hear of brutalities inflicted which would never have been tolerated in French schools. At Oxford and Cambridge, some privileges still remained to "noblemen" among the undergraduates, and brawls between Town and Gown were still not unknown.

All through his book, Taine emphasizes the acute sense of social class in England; distinctions of rank and wealth were much more rigorously observed than in con-

temporary France. This, together with the Englishman's excessive high spirits, amounting to a real propensity for starting a fight, struck Taine most forcibly about our national character. Finally, no reader will fail to be delighted by the illustrations from contemporary issues of *Punch*. Their inclusion is fully justified because Taine was an assiduous reader of the paper. One's only regret is that there was not room for more of them. G. S. DUGDALE

THE GEOGRAPHY OF THE PORT OF LONDON. By JAMES BIRD. *London: Hutchinson Univ. Library*, 1957. $4\frac{3}{4} \times 7\frac{1}{2}$ *inches; 207 pages; maps and plans.* 10*s* 6*d*

THE PORT OF LONDON. By J. GROSVENOR. *London: Staples Press*, 1957. $5 \times 7\frac{3}{4}$ *inches; 110 pages; plates.* 9*s* 6*d*

Interest in the port of London is perennial, and publication of these two volumes is to be welcomed as they are complementary in approach. The general editors of the Hutchinson University Library series have broken new ground in having a volume devoted to a functional aspect of one city, because hitherto the series has been concerned with facets of geography and not of areas. The significance of the port of London is such that a volume devoted to its evolution and trade, in the geographical setting, is well justified. London in its maritime activities is comparatively well documented from the 1790's when it was first the subject of a Select Committee of Parliament and has since been considered repeatedly by both Committees and individuals. Incidentally, Dr. Bird is a member of the staff of the Joint School of Geography which had, through the pens of Professor Ll. Rodwell Jones and Dr. Hilda Ormsby, already shown its interest in the development and functions of the port.

Dr. Bird prefaces his study with a short account of the site and of the physical development of the port before 1799, and by a review of the physical characteristics of the river highway. This is followed by a review of the port facilities, section by section, in which there is a careful correlation of the development with the physical conditions and the historical. The interplay of these factors is well demonstrated and there is considerable detail, which may not please the general reader, as to the use of particular warehouses. The volume, after considering the commodity markets, concludes with an assesement of the Port of London Authority and of trends which are affecting the traffic of the port and its further development. Dr. Bird has illustrated his volume by end-paper maps and by a number of diagrams. The small scale of these, necessitated by the page size, reduces their value, although most of the diagrams are confined to the minimum of detail and have a clear concept. This volume, well referenced, will be invaluable for all interested in the port of London.

Mr. Grosvenor, in his work, presents from a non-geographical standpoint a vivid description of the port. The volume is divided into three parts: "What is the port of London?" "Origins and history" and, lastly, a verbal cruise round the port. There is no map, but the volume has thirty photographs and while a number of these are so general that they might have been taken at any large port, the assemblage does serve to present a visual view of the wide range of the port and the activities carried on within its bounds. For those unfamiliar with port activities this work will serve as a useful introduction to the more academic survey by Dr. Bird. A. C. O'DELL

THE IMPERMEABILITY OF PEAT AND THE ORIGIN OF THE NORFOLK BROADS. A NOTE ON ACORN-DISTRIBUTING BIRDS. By MARIETTA PALLIS. *Glasgow: Robert Maclehose*, 1956. $6\frac{3}{4} \times 10$ *inches; 15 pages*

The Norfolk Broads are of first-class scientific interest as well as scenic beauty. Not the least puzzling problem is how they come to be there at all. Recently evidence has been accumulating that the origin of the present broads can be attributed to the activities of man. In the valley of the Yare and elsewhere borings have shown that the basins of a number of the broads have almost vertical sides, extending well down into the underlying peat, and that islands and ridges of peat occur within the broads

themselves. If one imagines the area drained and the silt removed, the scene would resemble peat workings, and the possibility that the broads are an area of flooded ancient pits cannot be lightly dismissed. But how was it possible to extract peat at what must have been up to 10 feet below water level? One may invoke fluctuations in the relative levels of land and sea, but Marietta Pallis, whose knowledge of the Broads is unrivalled, questions the necessity of such an hypothesis in this stimulating pamphlet. Quoting from her personal experience of digging an extensive bathing pool adjacent to Hickling Broad, she has discovered that water penetrates the compressed peat beneath the ooze only very slowly. She estimates that it would be possible with present water levels to dig peat to a depth of 8 to 10 feet, provided adequate bars were left in the pits, without flooding.

Included within the same cover is a note on the part played by crows in distributing acorns. PETER BELL

THE LATE-GLACIAL HISTORY OF THE HIGHLANDS AND ISLANDS OF SCOTLAND. By J. K. CHARLESWORTH. *Trans. Roy. Soc. Edinburgh*, (1954–5), pp. 769–928

In this lengthy paper Professor Charlesworth makes a pioneer attempt to reconstruct and correlate the sequence of stages whereby the last ice sheet receded from the whole of Scotland. The subject is a difficult one, and the task of forbidding magnitude. To accomplish it, Professor Charlesworth has studied and mapped at first hand the evidence in every part of Scotland, travelling in the process "many thousands of miles each summer" over an unspecified period of years, and his energy and persistence must command our admiration. In such an extensive work, accomplished single-handed, experts in different parts of the field are bound to find many points on which they differ from the author, and indeed the latter claims for his work no more than that it is "a beginning." It is, however, a very impressive beginning, and must for many years form the starting point for further studies.

The author bases his reconstruction mainly on the evidence afforded by moraines, fluvio-glacial deposits and marginal drainage features. The first two-thirds of the work consists of regional reconstructions from such evidence of the successive ice-margin positions, starting in Aberdeenshire and working around and across the whole country. Unless one happens to know each locality in detail these studies make difficult reading and it is to be regretted that the author did not preface them by some brief general summary. The accompanying maps would also have been more helpful in following the story if they had been drawn in such fashion as to allow successive stage-lines to be more readily identified and distinguished. The last third of the paper, however, which pulls these local studies together and attempts an overall synthesis, is of much wider general interest. Accepting the third of Bremner's suggested glaciations as the starting point, and naming it the "Highland Glaciation," the author first traces out the maximum extension of the ice at this time, concluding that it covered the whole of Scotland and the islands save for the northern half of the Orkneys and the moraineless enclave of East Buchan. From this maximum the ice-margins are then traced through a dozen stages of inward retreat to a well-marked "Stage M" which the author believes marks a definite readvance, and so styles the "Moraine Glaciation." It is claimed that this stage can be traced with confidence by the association of its moraines with the 100-foot raised beach. Further retreat then ensued, through a "Stage N" identified by its association with the so-called 50-foot raised beaches, into late stages in which the continuous ice-mass had contracted into separate units with valley-glaciers shrinking back towards their head-corries and nourishing snowfields. The final stages were marked by a maze of independent corrie-glaciers and residual ice-patches at high level. During the later retreat-phases many isolated peaks and masses in the outer areas of course stood out as nunataks and the author claims to have identified many such by their encircling moraines and drainage features.

The overall pattern thus presented contains little of novelty, but the reader is often tempted to ask whether the picture of a uniform retreat towards the higher ground is entirely justified. Early on, Professor Charlesworth states that the myriad moraines he uses for his reconstructions are "in general recessional" and represent pauses, or even slight readvances, in an "active retreat." Stagnant wastage *in situ* is scarcely considered, although in many areas it would seem to be inherently likely. Marginal drainage features, which are freely used, are also fitted neatly into the same thesis but, having in mind the very different ways in which such features can often be interpreted, the reviewer for one would have welcomed a fuller justification of many of the statements relating to them. But such points can clearly be best tested in the field. Interesting matters raised in the later sections are the methods used for correlation, including snow-line reconstructions, and the final suggestions for wider correlation of retreat phases inwards from the southern British "Old Drift" maximum. But on the last the author plans a separate paper.

Pleistocene experts will no doubt find many points to argue and contest in this monograph, and its conclusions could at many points have been more persuasively presented: but its interest and value need no emphasis. R. F. PEEL

THE SOILS OF THE COUNTRY ROUND JEDBURGH AND MORE-BATTLE (Sheets 17 and 18). By J. W. MUIR. THE SOILS OF THE COUNTRY ROUND KILMARNOCK (Sheet 22 and part of sheet 21). By B. D. MITCHELL and R. A. JARVIS. Memoirs of the soil survey of Great Britain. *Edinburgh: H.M.S.O.*, 1956. 9×6 *inches; 178 and 234 pages; maps and plates.* 30*s*

The Soil Survey of Scotland is to be congratulated on having achieved a most lucid and pleasing form of presentation for the large amount of useful information contained in these two works. It is to be hoped that the same layout will be used in future memoirs. As general descriptions of the areas surveyed, relating land use through soils to the main features of the physical environment, the memoirs deserve to become accepted as essential reading for geographers and biologists engaged upon local studies.

The memoirs contain good general descriptions of climate, geology and physiography, vegetation, agriculture and forestry. The principles of the soil classification employed are described in some detail, with excellent coloured photographs of typical soils. Soils are mapped as Series; that is, as landscape-units homogeneous with regard to the soil profile. As might be expected for areas strongly glaciated in the Pleistocene and too small to show major differences of climate, the differences between Series are mainly due to differences in parent material and drainage conditions—that is, the direction and extent of water movement through the profile. Series are grouped according to their profiles into major soil groups—Surface water gleys, Ground water gleys, Brown earths, Podzols, Hill peats (zonal) and Basin peats (intra-zonal). Both geographers and soil scientists will find the general discussion on these major groups and their occurrence very useful. The discussions are illustrated by generalized profile descriptions, in which the horizon nomenclature to be employed is defined. For cartographic and descriptive purposes the Series are grouped into Associations of soils developed from one parent material under different drainage conditions.

The general sections are followed by a catalogue of the Series mapped. Notes are given on the occurrence and agricultural potential of each Series. There are some excellent photographs of typical landscapes. Soil scientists will be glad to observe that the Survey has now grasped the nettle and laid down definite terms to be employed in the description of relief and slope, and the soil properties of structure, texture, consistence, etc. P. H. T. BECKETT

SOUTH WALES. By H. L. V. FLETCHER. The Queen's Wales Series.
THE BORDER COUNTIES. Edited by THEO LANG. The Queen's Scotland Series. *London: Hodder and Stoughton*, 1956 and 1957. 8×5¼ *inches;* 242 *and* 240 *pages; photographs, map in* SOUTH WALES *only.* 18*s*

These two volumes form part of a series designed to cover England, Scotland, Wales and the Channel Islands. Whereas the introduction to 'South Wales' gives no indication of the aim of the book—in 'The Border Counties' it is stated that: "This great series presents an entirely new and comprehensive survey of Scotland." Each place of interest is treated as a separate unit in alphabetical order, which facilitates reference. The information contained under the places mentioned is partly of geographical, partly of historical interest, but the greater part of the work is devoted to the romantic, legendary or dramatic events concerning people who lived in the area. The surveys cover most of the sizeable settlements, but for the geographer, the greatest gap lies in the relegation into the far background of the rural landscape. The short introduction to 'The Border Counties' and those to each county in 'South Wales,' do not give a complete synthesis of either the history or the geography of the area.

The Scottish volume covers the counties of Peebles, Berwick, Selkirk, Roxburgh and Dumfries. The book gains cohesion from the dominant historical characteristic of the area—that of a borderland. Constant reference to ruined castle and abbey, to attack and revenge, pervades most pages of this work. The imaginative writing of the author counts for a great deal, for he has brought to life at least the urban landscape of this strife-torn country. The illustrations, from a variety of sources, are of high quality, and although there is no reference to them in the text, they are inserted fairly near the place which they are intended to illustrate.

The Welsh volume covers the counties of Radnor, Brecon, Cardigan, Pembroke, Carmarthen and Glamorgan. This area is much more diverse than the border counties of Scotland, both historically and geographically. Again the emphasis is on the romantic and the legendary. Modern developments are largely excluded; this is particularly noticeable in Glamorgan where, for instance, there is no mention of the Margam Steel Works. By eliminating the utilitarian and modern, much of the true character of the county is lost; moreover, the paucity of information concerning the countryside results in a very unbalanced picture. The photographs, taken by the author, are good. However, the disassociation of illustration and text is serious: the church at Llangfihangel Helygen is an excellent example of a building which has not suffered from major restoration, but there is no indication in the text on p. 33 that there is a photograph opposite p. 100. For neither 'South Wales,' nor for 'The Border Counties,' can a claim to a complete survey be substantiated, though as guide books they combine a happy blend of fact and fiction calculated to delight and interest most members of any touring party.

S. H. COUSENS

PRE-FAMINE IRELAND: a study in historical geography. By T. W. FREEMAN. *Manchester University Press*, 1957. 8½×5½ *inches;* viii+352 *pages; maps, plans.* 35

In 1845 the population of the whole of Ireland exceeded 8,500,000. There had been a sharp increase in numbers from about 1770 but the peak was reached in 1845. The disaster of the great famine in the years between 1845 and 1852 is almost unimaginable. According to a recent medical history of the famine by Sir William P. MacArthur those years were marked by the death of at least 500,000 persons, and this he regards as a conservative estimate. In addition almost two million more emigrated from Ireland as a direct consequence of the famine. In the last hundred years the population of Ireland has declined, at first heavily and later more gradually, until now the island holds little more than half the numbers of 1841. The people living on the land have been reduced to less than half and in consequence the whole pattern of settlement has been vastly changed. No geographer can fully understand Ireland's present problems unless he sees them in relation to the background of the famine.

Mr. T. W. Freeman's 'Ireland,' a comprehensive regional geography of the island, was published in 1950 (*Geogr. J.* 116 (1950), pp. 226–7). He has now followed up that work with a geographical study of Ireland as it was in the years just before the famine. His new book is a specialized study in historical geography and thus differs from his earlier volume which gave only an incidental treatment of historical factors. The author was fortunate in that two admirable primary sources were available for his reconstruction of the geography of Ireland as it existed in the middle of the nineteenth century. It so happens that the Census of 1841 was very full and detailed in character; and it was equally lucky that by 1842 the Ordnance Survey had just completed the mapping of Ireland. The author was thus able to analyse the first edition of the six-inch to the mile maps of the country and to construct the numerous maps of population density for the regional chapters of his book.

The author made use of many other sources, government reports, surveys for new railways and canals, and accounts of visits by travellers like W. M. Thackeray, whose 'Irish sketch-book' appeared in 1842. He does not appear to have used the interesting work of the German geographer, J. G. Kohl, whose 'Ireland' was published in 1843. Anthony Trollope worked in Ireland in 1841–51 as a postal surveyor and witnessed the horrors of the famine and the accompanying pestilence; some of his earlier novels like 'The Macdermots of Ballycloran' (1847) give a good idea of what Irish life was like before the famine. A serious weakness of Mr. Freeman's book is the absence of even a brief account of the history of the famine itself. Fortunately the interested reader can now turn to a recent work, 'The great famine' (1956), seven historical essays edited by R. D. Edwards and T. D. Williams.

The historical geography of the nineteenth century has been much neglected by British geographers in favour of the earlier and remoter periods that are now so fashionable. In his great task of reconstructing the regional geography of the Ireland of 1841 Mr. Freeman has succeeded admirably. Not only has he shown how abundant is the geographical material available, but he has also demonstrated the value of writing down an exact account of life as it was lived at one precise time in relation to its contemporary landscape. The author has displayed with admirable clarity the changes that have taken place in the Irish scene during the past century.

E. W. GILBERT

THE POPULATION PROBLEM OF SOUTHERN ITALY: an essay in social geography. By ROBERT E. DICKINSON. *Syracuse University Press*, 1955. $8\frac{3}{4}\times5\frac{3}{4}$ *inches;* 116 pages*; maps, photographs.* $3.00

Professor Dickinson, well known for his regional studies of Germany, has entered into a new field of research in this study of southern Italy. The book is a general outline of the population problem of this under-developed area. As an essay in social geography its aim is to measure the conditions of overpopulation and the resultant low standards of living in terms of the geographical differences, and to seek solutions to these problems. The area studied is limited to the five compartments of the southern mainland, no reference being given to Sicily and Sardinia. The work is based on field studies carried out during 1951–2.

The essay is divided into four chapters. The two main themes of agricultural production and the labour force of southern Italy are preceded by an introduction on the demographic and economic background, and conclude with a summary of current trends and prospects. In view of the massive literature now available on *Mezzogiorno*, the essay is a useful summary of extensive reading and personal observations. Aspects of study such as the seasonal rhythm of labour and agricultural under-employment are emphasized usefully. The book is well illustrated with twenty-three maps. Four of these are of particular value, compiled by the author and his assistants: relief slopes (Fig. 9), available work-days for agricultural man-unit (Fig. 16), under-employed agricultural man-units (Fig. 17) and an index of population pressure (Fig. 21).

There is perhaps one criticism that may be made. The book suffers from severe

compression of material. As a serious study rather than a popular introduction, the geographer would like to have more reference to the physical variations of the environment. It is a pity, for example, that more use was not made in the text of the relief slopes, and that these were not shown on a regional scale. Climate is scarcely discussed, although it could profitably have been related to the crop rotations and the seasonal employment of labour. Malaria and the general conditions of hygiene are not dealt with, despite their relevance to the history of demography in the region. The wider implications of the imaginative and bold policies of the Italian government in the south also raise questions which the book might answer. The contrasts of the Italian "North" and "South" epitomize the greater scale of disparity which exists between western and southern Europe. But it is perhaps unfair to suggest how much a short survey should cover. It is the merit of the book that it treats clearly and succinctly problems which are complex and extensive. As a serious introduction to the population problems of southern Italy the book serves its purpose well, since it leaves the reader gripped by the geographical problems of poverty and desiring to know more. J. M. HOUSTON

THE SCANDINAVIAN WORLD. By ANDREW C. O'DELL. *London: Longmans Green*, 1957. 8½×5½ *inches;* xvi+549 *pages; maps, diagrams, plates.* 45*s*

This useful book fills a gap in the regional geography of Europe for the English student. The French have the combination of Zimmermann and d'Almeida to introduce them to the North, but their texts are a generation old. Andrew O'Dell observes that no one living in Scandinavia has written "a geographical review of the Scandinavian world." It is curious that the Scandinavian geographers, producing their substantial monographs or their admirable journals and touching our pride with their fine national atlases, should have neglected to provide the rising generation of geographers with a background study of their homeland. As bold as one of those "presumptuous" Jutlanders of Saxo Grammaticus, O'Dell has ventured where they have not. We may anticipate with pleasure the guide books which the "Nordic" geographers prepare for the 1960 congress of the International Geographical Union in Stockholm. Meanwhile, it has been left to an Aberdonian—from a safe retreat across the North Sea—to make good their omission.

His work falls into three parts—a physical and historical introduction, a country-by-country appreciation and an economic survey. It is always interesting to see an author grappling with the two main problems of a regional text—attempting to strike a reasonable balance in the treatment of the parts and to produce a harmonious study out of an uneven background knowledge. Bearing in mind Professor O'Dell's upbringing, it is to be expected that the western margins of Scandinavia should be more generously and informatively treated than the eastern landfalls. It is both good and natural that O'Dell should write more of the areas which are better known to him (*e.g.* a chapter on the Faeroes, two pages on the equally important Åland islands). In the treatment of such an extensive area as the Scandinavian world it is not surprising that some misrepresentation should occur. For example, the Finnish husbandman would find it impossible to recognize the farm types ascribed to his land in Chapter 6 and would probably disagree with much on the same page (p. 82).

Illustrative material is uneven in quality. There are some most original maps and diagrams, though not all are reproduced with equal success (*e.g.* the experiment with port facilities, figure 179). Some of the photographs add little to the text and the rather glossy paper is not kind to the illustrations at large. Battles of transliteration are fought with considerable effect, though Professor O'Dell admits to frequent defeat in his statistical sorties. He triumphs in selecting the only unexceptionable title for a text covering the Northern Countries. Finland may or may not be a Scandinavian state, but it is undeniably a part of 'The Scandinavian World.' W. R. MEAD

ASIA

THE WELLS OF IBN SAUD. By D. VAN DER MEULEN. *London: John Murray*, 1957. 9×5¾ *inches; 270 pages; illustrations.* 25*s*

THE LAND OF MIDIAN. By H. St.J. PHILBY. *London: Ernest Benn*, 1957. 9×5¾ *inches; 286 pages; maps and illustrations.* 36*s*

Mr. D. van der Meulen paid a number of visits to Arabia between 1926 and 1954, and from 1926 to 1931, and again from 1941 to 1945, was the Dutch diplomatic representative at Jedda. His book is not so much a tale of personal experiences as a study of Ibn Saud's character and career and of the political and spiritual development of Saudi Arabia. He has an expert knowledge of the Arabic language and of Muslim theology and traces with obvious regret the spiritual decline of Wahhabism as a result of contact with the West, especially with the Americans, and of the wealth derived from oil. The book ends with a series of pessimistic questions about the future of the country. "What of its faith that now lies discarded by so many, sold for a mess of potage?" There is much interesting matter about the part the British in general and individual Britons in particular, especially Lawrence and Philby, have played in the history of Arabia, and also about the achievements and mistakes of the Americans. Philby can no longer intervene in the country's politics and has no more history to relate but "must have a vast accumulation of geographical and allied material that still awaits publication." This book by such an impartial and well-qualified observer must not be missed by anyone who is interested in the politics and religion of the Middle East. There are excellent illustrations and a glossary, but no map.

In 'The Land of Midian' Mr. Philby has begun the task assigned to him by Mr. van der Meulen and given us in detail the geographical and archaeological results of a visit paid by him to the north-western corner of Saudi Arabia in the cold weather of 1950–1, supplemented here and there by observations made during later visits to the same area. He covered much unknown ground, but the principal centres had recently been visited by numerous Americans whom he criticizes "for their rather selfish enjoyment of remarkable opportunities of travel in unknown, or little known, country without the true explorer's sense of responsibility to record in detail at least the line of their routes and the names of places visited or seen by them." He certainly has not failed in this respect and presents us with a mass of place-names and minute details of many archaeological discoveries. The fare is lightened by an account of the daily incidents of his travels and particularly of his bickerings with guides who were unable to give him the correct names of watercourses and peaks. There are also some fine descriptions of scenery but I rather suspect that like other Arab enthusiasts Mr. Philby sees colour and beauty in what the ordinary mortal would regard as stark desolation. The book should be of the greatest value to future students of the geography and archaeology of the area. It is provided with copious illustrations, a good map and an exhaustive index.

RUPERT HAY

ATLAS OF ISRAEL. *Jerusalem, Department of Surveys, Ministry of Labour and Bialik Institute of the Jewish Agency*, 1956. 19×15½ *inches*

The first two folders containing portions of what promises to be a definitive Atlas of Israel have been received. The atlas is being published by the Department of Surveys of the Ministry of Labour in the Government of Israel, and the Bialik Institute of the Jewish Agency in Jerusalem. The subtitle enumerates "cartography, physical geography, history, demography, economics and education" as the fields it is proposed to cover and the atlas is being produced in a series of folders containing loose-leaf fascicules, each one opening out flat and producing a frame 43×64 centimetres containing one or more maps. This is an admirable arrangement for an atlas of a country which is changing and developing as rapidly as Israel.

Apart from the title-page and a list of contents in English, the atlas is published in Hebrew only. This is a misfortune for European students of Israel unfamiliar with

Hebrew, but it can hardly be a matter for criticism. The production and printing are admirable, and the scope of the work makes it a fascinating study for a geographer interested in any aspect of Palestine. The fascicules already received include some in each of the following sections: cartography, geomorphology, climate, history, population, agriculture, industry and commerce and communications. Nothing has yet been received in the projected sections dealing with geology, hydrology, botany, zoology, landscape evolution, settlements or services. Each sheet carries on the reverse a short and scholarly essay or series of notes on the subject matter of the map to which is appended an exhaustive bibliography of works in many languages. This publication will, when it is completed, be a delight to all geographers and other scholars interested in Israel, who are familiar with the Hebrew language. W. P. G. THOMSON

THE CHINESE ECONOMY. By SOLOMON ADLER. *London: Routledge, Kegan and Paul*, 1957. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 276 *pages; maps.* 25*s*

Books and papers on the geography of China published in the last ten years have stressed the difficulties in the way of economic progress in that country. Poverty in mineral resources, the shortage of capital for investment in industry, the low purchasing power of the peasants and the great pressure of population on the land are cited as powerful factors which hinder attempts of the Peking government to raise the living standards. It was difficult to present an accurate picture of the Chinese economy, because until recently the United Nations Secretariat at Bangkok received very little statistical information from Peking. The book under review is a well documented account by an economist with long first-hand experience of China. All aspects of the economy including land reform are examined, with the conclusion that a more optimistic view can reasonably be taken of China's future. On p. 8 three professors of geography are criticized for underestimating the mineral resources of China before geological surveys had reached a stage at which an assessment could be made. Recent progress in this field has revealed substantial new reserves, especially of oil, and much geological work remains to be done. On the question of capital, the author maintains that "it is clear from the 1949–52 record that China's expanding current output can cover not only the bulk of her immediate investment needs but also the maintenance and indeed the modest amelioration of her low living standards" (p. 56). There is an interesting contribution on the problem of how a trained factory labour force is to be created from simple peasants no longer needed on the land when agriculture has been made more efficient. Handicraft co-operatives have been established by the Peking authorities. There were over 11,000 in 1954, and they are expected to be valuable in training surplus rural labour which will ultimately become available for industrial employment. R. R. RAWSON

ONCE TO SINAI. By H. M. PRESCOTT. *London: Eyre and Spottiswoode*, 1957. $8\frac{1}{2} \times 5\frac{1}{4}$ *inches;* 310 *pages; maps and illustrations.* 30*s*

It has become fashionable to believe that the ability to appreciate the beauty of wild nature dates back only to the last century. But, in 1483, Felix Fabri made the pilgrimage from Jerusalem to Mount Sinai and Cairo and enjoyed it. Further, he analysed what his translator calls "an emotion so irrational." He wrote: "It is principally this that every day, indeed every hour, you come into new country, of a different nature, with different conditions of atmosphere and soil, with hills of a different build and colour so that you are amazed at what you see and long for what you will see next. All the time something new comes along which ravishes you with wonder, either at the marvellous structure of the mountain or at the colour of the ground, the variety of the rocks and pebbles . . . all of which delight the inquisitive." This delight he now passes on to English readers, thanks to Miss Prescott who from the vast heaps of his *Evagatorium* has quarried out and polished these two gems of books, 'Jerusalem journey' and now 'Once to Sinai.' All the folk he journeyed with and met come alive; "the strange Arab whom I had never seen before, who did the most absurd things so that I thought I should not be able to stay on my donkey for

laughing" down to the convent dog at Ulm "who knew me through the gate and with a strange joyful howling and whining scratched and bit at the planks as though he would tear the gate down in such a hurry he was to get to me." The dog was right, Fabri's acquaintance is well worth making. G. W. MURRAY

LAND REFORM AND DEVELOPMENT IN THE MIDDLE EAST. By DOREEN WARRINER. *London: R.I.I.A.*, 1957. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 198 *pages; maps.* 18*s*

This is the second study of the land problem in the Middle East which Miss Warriner has published since the war. The urge for agrarian reform in the Middle East, and the changes in social structure which must attend it have been given a new impetus by the Egyptian revolution. The approach to it is often ill thought out and sometimes unpractical in Middle East countries, but Miss Warriner is clearly right in her two assumptions, that it is essential, in any attempt to study the evolution of the Middle East, to start with an appreciation of the land problem, and to understand the new awareness of this problem which has arisen in the countries of the area as a result of the events in Egypt.

Ownership of land in the Middle East is traditionally synonymous with the ownership of capital. It was so in the days of the Pashas in Egypt, it is still so today in 'Iraq, and can be seen in the purchases of town property which the Arab beneficiaries of oil royalties make in Egypt's cities and in Beirut. Any movement towards a more liberal society, and any social revolution in the Middle East must place agrarian reform very high up on its list of priorities, and its promoters must be seen to be redistributing land even if the machinery for replacing the services of the dispossessed landlords lags behind the political drive for reform.

The author analyses the three driving forces which she sees behind the development taking place in Egypt, Syria and 'Iraq, and evaluates them according to the effect they have upon land ownership, and the use to which the land is put. Briefly, she finds that reform in Egypt, private enterprise in Syria, and public money in 'Iraq are behind the changes which are taking place. In Egypt there is pressure on the land, in most of Syria and in 'Iraq the opposite is the case, and it is difficult to compare the effect of these three forces in these three very different environments.

Miss Warriner sees in Egypt a reforming zeal triumphing over an impossible situation, where the maximum use of land has already been attained under the old landlordism, and there appears to be little that can be done except to shuffle the pack. Some students of the Middle East might not agree that the economic and social effects of the Egyptian revolution are as favourable as the author makes them out. Miss Warriner does a great service in drawing attention to the private enterprise which is doing so much in Syria today, in spite of the political climate. The use to which the oil royalties of 'Iraq are being put is easy to criticize, especially in the context of the amount of work which needs to be done to repair the neglect of centuries in a land where the rivers are not so kind as the Nile. The politico-social problem of land ownership in 'Iraq is only a part of the trouble. Owing to the progressive salting up of the cultivable area, the tribal "latifundia" have been necessary in the past to ensure that each section of the population had somewhere fertile to cultivate. It is not possible to solve the social problem without the agricultural one, and it is especially difficult, when the urge for progress comes from the towns, to pay proper attention to the demands of the land.

The feeling which Miss Warriner's study leaves is that the most effective of the three "dynamics" which she analyses is the socially old-fashioned "laissez-faire" capitalism practised in the Jazirah of Syria. This intelligent use of "risk capital" seems to be at the bottom of it all. It is perhaps not unfair to say that the Egyptian experiment employs no capital, and the 'Iraq Development Board has some of the defects of state capital which we have learned to recognize in this country.

The author's accounts of the land tenure system in the Ottoman Empire and the changes since 1918 are clear and easy to follow, but it is when she is describing the

areas she visited that her book becomes really alive. One wishes Miss Warriner had had more opportunity to travel, and to clothe the rather dry bones of her subject.

W. P. G. THOMSON

THE SOVIET FAR EAST. By ERICH THIEL. *London: Methuen*, 1957. 5½×8½ *inches; 388 pages; maps and tables*

Professor Thiel's 'Sowjet-Fernost' appeared originally in 1953 as the first volume of his projected composite work on the Soviet Union, and it forms Volume I of the publications of the Osteuropa-Institut of Munich. It was reviewed in the *Journal* for June 1954, pp. 229–30. The English translation is by Annélie and Ralph M. Rookwood, and includes several corrections to the original German text, received from the author, as well as certain revisions. This is probably the best compendium available on its subject, covering the area more comprehensively than any known Russian work. Although it cannot be regarded as up to date, going only up to about 1950, it is an invaluable reference book on an area of increasing interest and importance.

EASTERN PICTURE BOOKS

Two recent books of photographs present a general picture of the scenery and historical places of interest in Turkey and Persia. TURKEY (*Turkish Press, Broadcasting and Tourist Dept.*, 1957) is a Government produced publication, with captions in English, French and German. The reproductions are all in sepia and though many of the photographs are of a high quality few are outstanding. A majority of plates show historical buildings or remains of great beauty although too many simply show modern streets or new buildings. Far more attention could have been given both to the people and to the scenery of the country with its contrasting plains and rugged mountains. The general effect is to show the mingling in Turkey of the ancient histories of the Byzantine and Ottoman Empires with the modern state created by Kemal Ataturk.

A. Costa and L. Lockhart's PERSIA (*Thames and Hudson*, 1957, 50*s*) is of a different quality. The historical introduction, short and concise but well presented and packed with information, leaves the reader anxious to learn more. The book has the advantage of five superb colour plates while the remaining black-and-white photographs are of high quality. The authors place most emphasis on Persia's unique history and with monuments dating centuries B.C. it is easy and right to do so. Like the companion book on Turkey they tend to show too little either of the people—though the plates which do deal with them are humorous and give some idea of the variety of types—or of the rugged grandeur of scenery.

The third book under review takes us to the further limits of Asia (SARAWAK, by Hedda Morrison: *MacGibbon and Kee*, 1957, £3 3*s*). This fine collection of some 250 photographs, all amply annotated, illustrates many aspects of Sarawak's life; it is not a comprehensive picture, and the balance between different subjects is unequal, but the author makes no claim to have produced a complete record. The book is divided into sections on the country in general, on padi, on economics and on the various races which inhabit Sarawak—Melanaus, Malays, Chinese, Ibans, Land Dayaks, Kayans and Kenyahs, Muruts and Kelabits, Penans. Scenes, whether of countryside, village or longhouse, have been carefully chosen to illustrate as many aspects of Sarawak life as possible, but Mrs. Morrison has produced her best photographs in portrait studies of people. The last five plates in the book, devoted to the timid Penans, include perhaps the finest facial study of all.

GUY ARNOLD

AFRICA

RACES OF AFRICA. By C. G. SELIGMAN. Home University Library No. 144. 3rd edition. *London: Oxford University Press*, 1957. 4×6½ *inches; 236 pages; maps. 7s 6d*

When this work first appeared in 1930 the reviewer in the *Journal* said, "Professor

Seligman has succeeded in the difficult task of presenting in a very readable form the enormous mass of information packed into his ten chapters" (*Geogr. J.* 76 (1930), p. 169). Now, after more than a quarter of a century's useful life as an introductory study of the races of Africa, it has needed revision, not because of any fundamental changes in the author's original thesis but as a direct result of the many field investigations of recent years undertaken very largely by Professor Seligman's own students. Many of these anthropologists have shared in this revision, though the general arrangement and, wherever possible, the original wording and content has been kept. "It is an index of his scholarship and expertise in all fields of anthropology," the publishers note, "that what Professor Seligman could do almost single-handed has now required the collaboration of many."

For the geographer the value of this book lies not only in the scholarly yet clear way in which the facts about the races of Africa are recorded but in the firm manner in which the author emphasizes the geographical background to much of what he describes. Had all the subsequent anthropological work in Africa had the same basis there would have been a much fuller and clearer appreciation of the complex relationships between land and population in Africa than has often been the case. The map showing diagrammatically "some of the main features of Africa that are of importance as conditioning or explaining the distribution of its peoples" (open country, desert or poor steppe, tropical rain forest, etc.) could certainly be elaborated or modified in detail in the light of recent intensive field-work, but it serves still as a reminder of the reality of physical limitations, notwithstanding all the economic and social changes of the present century. Similarly the map indicating the major Bantu divisions is valuable as a background to the many detailed (sometimes excessively so) anthropological treatises now available.

Important though it is to recognize the diversity of African peoples and cultures, it is nevertheless necessary to be reminded of the broad lines and the general similarities that this book describes so admirably. With the increasing number of volumes in the International African Institute's 'Ethnographic Survey of Africa,' the need for an authoritative and yet small introduction to the further study now possible is even greater than when it was first published. It is a book that could be read with profit by all students of African affairs. It does not pretend to deal with "modern problems" —not even those arising from racial contacts and differences: but an appreciation of the facts described by Professor Seligman would undoubtedly contribute towards the understanding of many of the problems that bedevil Africa today. R. W. STEEL

THE TRADE OF LAKE VICTORIA. By V. C. R. FORD. East African Studies, No. 3. *Kampala: East African Institute of Social Research*, 1955. 9½×6 *inches;* iv+66 *pages; maps, tables and illustrations*

The East African Institute of Social Research deserve thanks for making possible the publication of a monograph of this nature. All too often it is difficult to find a publisher for a specialized study of this length, and Mr. Ford's work deserved to appear in print. He deals thoroughly with all the many facets of the trade of the greatest African lake, in terms of its historical development and its place in the contemporary (1952) scene. Perhaps more attention might have been given to passenger traffic. Trade has contributed little to the development of any unity between the lands surrounding the lake; in the past, because of its vastness, it functioned as a "dividing sea." Under certain weather conditions navigation can be difficult and from a geographer it would have been interesting to have been told a little more of this problem. Local trade is still small, the major trade is of a transit nature, having been influenced greatly by the construction of the railways in East Africa. This aspect of development is discussed in detail. The all-important maps are contained in a pocket at the back of the book and can therefore be directly consulted with any part of the text. It is a pity that some method could not have been devised to make more direct comparison possible of the seven maps of total traffic at different times between 1913–14 and 1952.

R. M. PROTHERO

GÉOLOGIE ET GÉOGRAPHIE DU KATANGA. By MAURICE ROBERT. *Brussels: Union Minière du Haut-Katanga*, 1956. 11×7½ *inches; 620 pages; maps, plates, diagrams*

The Katanga area of the Belgian Congo is in many ways typical of much of the African continent, though it is known to most people by virtue of its extraordinary wealth of minerals. Its extensive peneplaned surfaces at several levels, its climate, its *Brachystegia*-dominated savannah, and its people can be paralleled in most African countries lying within the tropics. To one who, like the reviewer, has visited the area it is notable on the other hand for its well-planned townships, the industry with which the enormous mineral wealth is being developed and, probably, its enormous anthills.

This volume has been compiled by an author who is very familiar with the Katanga and is a geologist of international repute. The record of the area as set down in this work is extremely detailed even, in many chapters, to the extent of being discursive, and much is discussed and portrayed that has only a very indirect bearing on the Katanga itself.

The discussion of the geology is carried out in a manner that will not commend itself to British geologists. The author begins with a preliminary study of the continental beds and then deals with the folded rocks. The continental beds are subsequently described in detail from the oldest to the newest, but the folded rocks are dealt with in exactly the opposite way. Thus when the reader arrives at a description of an interesting formation, such as the "Grand Conglomérat," he is not in a position to anticipate the types of boulders and pebbles which make up this deposit. Although the Basement Complex is mentioned in many places and depicted as occurring in numerous localities on the geological map, no description of these rocks could be found. Nor are any details given either of the post-Kibara granites, which are of utmost importance in the case of Manono tin, or of the large occurrences of basic igneous rocks also depicted on the map in the northern part of the area covered. Numerous correlation tables are presented of the stratigraphy of southern Africa but those in which the succession is compared with that of Europe must remain extremely speculative.

In the section on relief and hydrography the author indicates convincing cases of river capture within the head streams of the Upper Congo, a feature which probably has much application elsewhere in Central Africa. The chapters on the penetration of the Katanga by the European are very well done and make most absorbing reading. Finally, the development of the resources of the area is covered in a very detailed fashion and a tribute paid to the work of Union Minière under whose patronage the volume was written. Nor does the author stress only the advances made in the field of mining but also indicates the very considerable developments in agriculture, forestry, pisciculture, and in other ways, as the reviewer has seen for himself. The book is well produced and illustrated, though many of the photographs were taken far away from the Katanga. Numerous spelling mistakes are to be seen, particularly where the author ventures into languages other than French. K. A. DAVIES

THE ORIGIN OF THE AFRICAN FLORA. By A. S. BOUGHEY. *London: Oxford University Press*, 1957. 8½×5½ *inches; 48 pages; sketch-maps*

The establishment of a University College in Central Africa provides a magnificent opportunity for those interested in the evolution of the Continent and its flora and fauna. For botanists Africa is of special promise for a number of reasons; not least because even by the end of the Palaeozoic the Continent was, as it is today, the meeting place of distinct northern and southern floras. How the diverse vegetation of present Africa has been derived from the earlier is the theme of Professor Boughey's inaugural lecture at Salisbury. His account touches with erudition upon a number of fascinating topics; in particular, the origin of the flowering plants, and the theories of Continental drift (to which recent studies of terrestrial magnetism have given added

plausibility). Many of his views are admittedly speculative and some hard to accept; for example, that divergence among the flowering plants had progressed sufficiently by the end of the Palaeozoic to account for the world-wide distribution of such genera as *Cardamine* and *Viola*. Nevertheless, this is a stimulating and welcome account. If it presages a combined attack by the biologists, geologists and geographers at Salisbury upon the evolutionary problems of Africa, we may look forward to exciting developments.

PETER BELL

THE ROYAL AFRICAN COMPANY. By K. G. DAVIES. *London: Longmans Green*, 1957. 8½×5½ *inches;* ix+390 *pages; maps.* 42*s*

The introduction of sugar cane to the West Indies in the mid-seventeenth century, and the subsequent development of plantation agriculture, led to a demand for labour which was met by the slaving activities of various European nations along the west coast of Africa. This was a further development in the policy of commercial exploitation with the minimum of settlement with which France, England and the Netherlands, in particular, had challenged the monopoly of trade in this area formerly held by Portugal. In 1672 the chartered Royal African Company, a joint-stock venture, was established to prosecute English interests. It was at no stage conspicuously successful in its activities for various political, commercial and economic reasons. The wars of 1689–97 and 1702–13 had serious effects on shipping, the Company failed to supply the slaves required and, in spite of the official monopoly it held until 1712, it failed to compete with the activities of individual traders. By the end of the first decade of the eighteenth century the Company was virtually bankrupt though its activities were not finally ended until 1750.

To relate the story of this venture requires the analysis of a complex piece of economic history. This has been very adequately accomplished by Mr. Davies in an extremely well documented work, based for the most part on the original papers of the Company. Inevitably it is highly specialized, but, at the same time, there is much to enlighten and of value for the general reader who is interested in West Africa. The Company was responsible for the establishment of various forts and factories from which it carried on its trade. The former were economically unsound, but they were, nevertheless, important for establishing for the first time English interests in this part of Africa. These interests were to lapse and were not to be revived again and fully developed until the latter decades of the nineteenth century. But in many respects the initial foundations were laid for the eventual establishment of British rule, particularly in the Gold Coast.

R. M. PROTHERO

ROCK OF EXILE: A NARRATIVE OF TRISTAN DA CUNHA. By D. M. BOOY. *London: J. M. Dent*, 1957. xi+195 *pages;* 15 *pages photographs, map.* 25*s*

Tristan da Cunha has long been famous as one of the world's loneliest inhabited islands, and much has been written about it. Yet this is almost the first, and certainly the best, account of the islanders as they really are. Mr. Booy spent fourteen months on Tristan, as a member of the garrison of the Naval Radio Station which was established there in 1942. His account includes all those special features of island life made familiar by earlier writers. There are stories of boat construction and house building; of dances, and New Year festivities; of trips to Sandy Point for apples and to Inaccessible Island for guano; and of many homelier topics. But while these Tristan peculiarities are fully described, this book is very far from being a mere catalogue of oddities. The islanders emerge as sane, normal, warm-hearted people whose strange ways reflect conditions of geography and history rather than any innate mental aberration.

This book has one deliberate limitation. It is concerned with the people; it does not discuss the terrain, history, climate, or wild life of the island except in so far as they impinge on the life of the inhabitants. It also has one regrettable feature (albeit of a kind which it is hard to avoid in any account of living people). Running through its pages there is a story of a friendship which developed between the author

and a certain young island girl. The author admits that "it could not be kind" of chance visitors such as himself to inspire the affections of the islanders; one wonders whether good taste should not have withheld him from writing about it afterwards. Like a good portrait, this book may not be welcomed by its subjects. But few people will deny the accuracy or the charm of its portrayal of island life.

M. W. HOLDGATE

NORTH AND SOUTH AMERICA

PHYSICAL GEOGRAPHY OF THE QUEEN ELIZABETH ISLANDS. By ANDREW TAYLOR. *New York: American Geographical Society*, 1956. 11 × 8½ *inches; Vol. I*, 105 *pp.; Vol. II*, 90 *pp.; Vol. III*, 99 *pp.; Vol. IV*, 85 *pp.; Vol. V*, 46 *pp.; Vol. VI*, 95 *pp.; Vol. VII*, 80 *pp.; Vol. VIII*, 77 *pp.; Vol. IX*, 94 *pp.; Vol. X*, 53 *pp.; Vol. XI*, 30 *pp.; Vol. XII*, 10 *folding maps; illustrations, plates*

The author set himself a huge task in preparing this treatise for the American Geographical Society, supported by the United States Office of Naval Research, for the work has included not only a survey of all the existing literature but also the perusal of some thirty thousand air photographs, available since 1950, which cover the whole area of the Queen Elizabeth Islands. Under pressure of time and in the face of a continual influx of new data from field surveys, he bravely decided to fill a gap in readily available information by a synthesis of all that was known at the time of writing of the physical geography (and geology) of the Queen Elizabeth Islands. During the writing "hundreds of pages were . . . made obsolete and necessarily discarded and rewritten." And, as noted at the beginning of Volume I, parts of the treatise were written prior to the publication of important papers by officers of the Geological Survey of Canada, in particular Y. O. Fortier and R. Thorsteinsson, although the chapter on geology (Vol. I) was written in the light of these papers. But it was not until the year 1955, after the treatise was written, that the main structural and stratigraphic units of the Queen Elizabeth Islands were defined by the Geological Survey's "Operation Franklin," immeasurably the most important geological survey of the islands ever made or likely to be made in the near future.

In a brief review it is impossible to deal with a work of such length and detail except by making a few general comments: indeed the reviewer makes no apology for having read only certain sections completely. This leads to the suggestion that the work might have been condensed with improvement. Admirable features of the treatise are 181 well-chosen air photographs, which are presented as photographic prints with explanatory footnotes, and ten folding maps, plotted from air photographs with only the interior ice caps of the larger islands sketched. The treatise could have been shortened considerably if the photographs and maps had been allowed to speak more for themselves, thus saving a good deal of purely descriptive writing on the physiography of the islands (Vols. II–X). The practice of repeating the ill-informed statements of early travellers is also questioned; hardy men though they were, they very seldom had any knowledge of geology or physiography and were usually travelling when the ground was more or less snow-covered. Thus Peary is quoted describing the peak at Cape Columbia as "a steep conical pile of loose stones," while R. G. Blackadar (1954), who is also quoted, has reported massive granite and gneiss from this area. Such statements should be used with great discrimination and only after checking against air photographs and any later reports.

While omission of much purely topographical data and more sifting of previous reports might have been desirable, Dr. Taylor is to be congratulated on drawing attention to so many interesting features from his study of the air photographs. Future field work may well prove many of his observations and theories correct, as for example that the rolls on the Ellesmere Ice Shelf originated through wind action and that the remarkable vermiform erosional pattern, unique in the Queen Elizabeth Islands, at the head of Clements Markham Inlet, is due to solution erosion in an extremely homogeneous material since the retreat of the ice.

Knowledge of the geology of the islands up to 1953 is admirably summarized in Volume I. In his section on glaciology (Vol. II) the author points to the divergence of views on the previous ice cover of the Queen Elizabeth Islands; some favour a complete continental ice cover, others an ice cover no greater than the present. Dr. Taylor correctly cautions against interpreting the paucity of recorded striae and glacial deposits as evidence against widespread glaciation in a region of intense frost action and of solifluction, and in one of recent coastal submergence. He might have stated more clearly that much glacial material could have been laid down beneath the sea. He rightly, but perhaps at unnecessary length, points to the fiords, especially of western Ellesmere Island, as unequivocal evidence of former more widespread and intense glaciation. His proposal of almost complete glaciation of the islands may well be correct, but he need not have elaborated his theory by suggesting that there was a main flow of ice right across Ellesmere Island from Greenland. In our present state of knowledge the simplest explanation is surely the best, namely that areas in northern and southern Ellesmere Island, with their high mountains, were centres of glaciation from which glaciers moved outwards to join the ice from Greenland, Labrador and Keewatin.

It is necessary to take issue with the author on the matter of place-names. However carefully readers are cautioned, unauthorized names appearing in print, even if the writer gives them in inverted commas (Dr. Taylor doesn't on his maps), acquire a spurious authenticity. The portmanteau name "Bruncoga" is in any case a monstrosity! The technical nomenclature is also sometimes at fault, as in the phrase "an ancient shelf ice." The difficulties of writing a treatise of this kind are obvious, but Dr. Taylor has succeeded in producing a most useful reference work, which is the result of an exhaustive study of the literature (of which Volume XI is a very valuable bibliography) and of the air photographs, and of much intelligent theorizing from scattered field data up to the year 1953.

G. HATTERSLEY-SMITH

GEOGRAPHICAL DISCOVERY AND EXPLORATION IN THE QUEEN ELIZABETH ISLANDS. By ANDREW TAYLOR. Department of Mines and Technical Surveys, Geographical Branch. Memoir 3. *Ottawa: Queen's Printer*, 1955. $9\frac{3}{4} \times 6\frac{1}{2}$ *inches;* vii + 172 *pages; plates, maps.* $1.00

In writing about the Queen Elizabeth Islands Dr. Taylor draws on a wide knowledge and experience of the polar and sub-polar regions. Before the war, as a civil engineer he did survey work in northern Manitoba. At the end of the war, as a seconded officer of the Royal Canadian Engineers he established the first sledging base of the Falkland Islands Dependencies Survey, and so laid the foundations for future survey work in Graham Land. Since the war he has seen arctic and sub-arctic service both as an army officer and as a civilian consultant.

Geographical discovery and exploration in the Queen Elizabeth Islands ended a few years after the Second World War; the aeroplane saw to that. Satisfactory topographical maps, prepared from air photographs, are now or will shortly be available of the whole area (although better ground control is needed in some places). More and more scientists will now be going to the islands to carry out detailed work, for which the five weather stations are centres or starting-points. Dr. Taylor's timely memoir takes stock of the pioneer work in an era which has just closed, and is welcomed as a convenient source of historical material and references from which to introduce future work.

After a brief introduction on the geography of the islands, the work of all expeditions which touched the Queen Elizabeth Islands from the time of the Norsemen to the voyages of the *St. Roch* in 1940–4 is briefly described. While the arrangement is strictly chronological up to the year 1859, accounts of subsequent expeditions are divided between three chapters headed "The assault on the North Pole," "British and foreign expeditions of the post-Franklin period" and "Canadian expeditions," and the chronological sequence is broken—which is perhaps unfortunate. The longer

voyages and sledge journeys are most usefully illustrated by route maps in the text. There is an excellent bibliography, which includes the scientific appendices to the reports of expeditions and which is cross-referenced by means of footnotes to the accounts of the various expeditions.

It is a pity that there are a number of minor errors and misleading statements, which tend to defeat the purpose of a work of reference. For example, Godfred Hansen's depot-laying journey to Cape Columbia was in support of Amundsen's projected North Polar drift in the *Maud*, not of his trans-polar flight (p. 102). The map of Peary's 1908–9 journeys does not show the depot-laying journey to Cape Fanshawe Martin, 90 miles west of Cape Columbia (p. 78). The map on page 128 suggests that Anstead sledged right round Axel Heiberg Island in 1929, whereas in fact it was Stallworthy who made this journey in 1932. Other errors could be cited. It would be nice to have an amended edition of this otherwise very valuable memoir.

G. HATTERSLEY SMITH

A PRELIMINARY GUIDE TO THE ARCTIC BLUE BOOKS AND PARLIAMENTARY PAPERS OF THE NINETEENTH CENTURY. By ANDREW TAYLOR. *Arctic Circular*, **8** (1955) no. 3, pp. 2–30; The Arctic Circle, Ottawa.

As a by-product of his researches into the history of exploration of the Canadian Arctic Islands Dr. Taylor has compiled a most useful list of Arctic Blue Books and Parliamentary Papers with an introduction on the procedure for publication of these papers. As he points out "until quite recently they have been the basic source of knowledge of broad areas of the Canadian Arctic." Forty-seven papers known to concern the Canadian Arctic are listed, of which thirty-five are concerned with Franklin's last expedition and the subsequent search expeditions, and eight with Nares's expedition.

G. HATTERSLEY-SMITH

THE ANCIENT CIVILIZATIONS OF PERU. By J. ALDEN MASON. *London: Penguin Books*, 1957. 4½×7 *inches;* 330 *pages; maps and plates.* 6*s*

Even today the man in the street is apt to think only in terms of Incas when the archaeology of Peru is mentioned. But over the last fifty years archaeologists have been adding steadily to our knowledge of the narrow coastal strip of South America, and the Andean chain behind it. The last fifteen years have seen stupendous advances. Dr. Mason's book sets out to give us a complete picture of the development of civilization in this area from about 8000 B.C. to the Spanish conquest. As an archaeologist of long standing he is well qualified for the task.

The early chapters of the book are a careful and reasoned account of the cultural history of the area down to the rise of the Inca Empire. Such an account without the aid of written history, and with no heroes or personalities, might well become a dreary welter of unconnected facts. Dr. Mason, following the modern trend in Peruvian archaeology, avoids this danger by considering each period in terms of its functional position. The earliest phase, represented by the first glimmerings of agriculture and by shell mounds, falls into the category "incipient." The next nine hundred years or so embraces a "formative" period of isolated advances, followed by a cultist period, in which the population seems to have been unified by the worship of the feline deity at Chavin in the highlands. This in turn was superseded by a period of individual advances both in style and technology in each isolated coastal valley. The period from 300 B.C. to A.D. 500, typified by the civilizations of the Mochiea with their well-known pottery modelled in relief, and by the magnificent textiles of Nasca and Paracas, is appropriately termed "florescent." The last era, the "climatic," saw the rise first of the culture of Tiahuaenaco, which after spreading from the highlands, broke down into individual military states, which were themselves overthrown by the Incas, and yet another dominating influence from the Highlands.

The rest of the book is a straightforward account of the history, legendary and

factual, of the Incas, their social and political organizations, religion and various arts and crafts. This section of the book follows fairly closely the lines of Rouse's contribution on the Incas to the "Handbook of South American Indians." There are one or two passages in the technology section which are open to question. Generally speaking this book is probably the best general account available to the layman in this country. The illustrations are good, but would have been more useful if Dr. Mason had given the provenance and dating of some of the illustrations of metal work, but such information is difficult to obtain. There is a valuable note on sources and a comprehensive bibliography.

ADRIAN DIGBY

TO THE CITY OF THE DEAD: an account of travels in Mexico. By GEORGE WOODCOCK. *London: Faber and Faber*, 1957. 9×5¾ *inches; 271 pages; map and illustrations.* 25*s*

MAN AND MAMMOTH IN MEXICO. By HELMUT DE TERRA. *London: Hutchinson*, 1957. 9¼×6¼ *inches; 191 pages; maps and illustrations.* 25*s*

Few observers of the Mexican scene have been able to portray so fully and so critically the human components of Central and Southern Mexico as this distinctive travel book by George Woodcock, who, in 1953, with his wife, crossed the Río Grande, journeyed through the Mexican heartland and penetrated into the state of Oaxaca. It is not the hackneyed recital of a journey, nor the second-hand reworking of familiar material, but a fascinating synthesis of impressions and experiences which have been fused together in order to make an intelligent and honest assessment of the contradictions and problems of this most important unit of Latin America. This is not travel for the sake of travel, excellent though its descriptions of deserts, jungles and mountains are; but a stimulating and most worthwhile attempt to interpret what the travellers saw. There is nothing patronizing, for example, in his condemnation of the bull fight nor his description of *proyectismo*. He is giving a sympathetic and factual presentation of the *mores* which motivate Mexican attitudes and behaviour. So it is whether Mr. Woodcock discusses films, religious festivals or the *ejido*. The reader will enjoy the clarity and objectivity of the author's impressions, conveyed in the vivid style we have come to expect from this master of prose. Geographers and laymen alike will not find better background reading on Mexico.

'Man and mammoth in Mexico,' Dr. Helmut de Terra's account of his adventures and discoveries in the same area during six years of archaeological research, is of more specific interest to those who wish to keep abreast of the important contribution which radio-carbon dating is making towards an understanding of pre-Aztec history in Mexico and Guatemala. Although popularly written, it is scientifically reliable and presents the basic material on the antiquity of man in North America, and in some of the more interesting archaeological sites of this part of Middle America, including that of Tepexpan fossil man. This material is, however, mixed up with a wide variety of anecdotes and travel experiences which results in the reader alternating between present-day impressions and the story of the past. Dr. Terra endeavours to bridge this gap by showing the culture continuity which exists through the millennia. Translated from the German, the book suffers from a somewhat staccato style which weakens the flow of the narrative. Illustrations are good, but the map of North American prehistoric sites on p. 21 is poor cartography and conveys very little.

G. J. BUTLAND

USA: die Erschliessung eines Kontinentes. By HANS BOESCH. *Bern: Kummerly und Frey*, 1957. 6×8½ *inches; 272 pages; maps and plates*

Dr. Boesch has a vast subject in the opening-up and exploitation of United States territory by settlers of European stock, but, by concentrating on the outstanding geographical and historical factors and selecting the detail carefully, he keeps his study within reasonable limits. On the one hand, he describes the natural, or pre-settlement, landscape and the cultural landscapes which have replaced it through the activities of

the American people: on the other, he draws upon history to explain the particular forms these activities have assumed at various times and in different regions, and the extent to which the environment has imposed limitations on them. The "frontier spirit," of which so much has been written, is related to conditions in the Anglo-Saxon colonies, which had no parallel among the French or Spanish settlements. The contrast between the northern and southern English colonies is also succinctly summarized. The regional sections are clearly done and convey the sense of constant movement. Frequent comparisons or contrasts strengthen the presentation: the sketches, for example, of the industrial revolution in the South, of the growth of petrochemical industry on the oil fields of the Gulf States, and of the individual characteristics of Californian industry, combine to convey a vivid impression of the many facets of the American economy. The author's views of the city in modern American life fittingly round off his exposition. The book, written in a plain straightforward style, conveys a great deal of information in relatively small compass.

G. R. CRONE

THE EXPLORATION OF THE COLORADO RIVER. By JOHN WESLEY POWELL. *University of Chicago Press; London: Cambridge University Press*, 1957. 8¼×5¼ *inches;* xxi+138 *pages; illustrations.* 28*s*

It is sometimes difficult to realize that less than ninety years ago the region dissected by the Colorado was a great blank space of which we were almost completely ignorant. The filling-in of the map of this vast basin was primarily the work of John Wesley Powell, who not only provided the layman with a thrilling account of the wonders and terrors of the mighty river but gave the geologist and geographer a series of scientific reports encyclopaedic in their content and remarkably prescient in their appreciation of the environment of the West and its potential use and limitations. This volume confines its attention to the story of exploration. Based on Powell's original report published in 1875 it is the verbatim day-by-day record of how a small group of trappers and ex-soldiers, with a one-armed leader, made a violent boat trip down the Green and Colorado rivers and so effected the last major exploration within the continental United States.

In spite of the rhetoric, the nineteenth century inflations, the florid descriptions and analysis of the feelings of his party, and the few factual errors, it is the vivid sense of originality, of participating in an immortal feat of exploration which will grip the reader; and it is Powell's use of the historic present which plays a large part in this. Read by a geographer, however, it has more to offer than the excitement and drama of their many adventures, for Powell's observations on lithology, vegetation and the erosional features of the great gorge provide an excellent description which is still the most readable account available. The previous edition was last printed in 1915, and geographers will welcome the fact that no longer will it be necessary to search libraries and second-hand bookshops to secure a copy of this classic. The illustrations reproduced from the original 1875 edition and a remarkable frontispiece reproduction of a photograph of Powell in 1873 add interest to a most attractive volume.

G. J. BUTLAND

SOUTH AMERICAN TRAVEL

A river some 1500 miles long has a source very much like any other, but place the river in the tropics and the upper 200 miles or so of its course in thickly wooded and unexplored mountains and the discovering of the source becomes a major excitement, even if the source itself be undistinguished. The upper course of the Orinoco remained unmapped and unknown until ascended by Joseph Grelier and his party with the very welcome and unexpected assistance of the Venezuelan Government: the book which has resulted is called TO THE SOURCE OF THE ORINOCO (*H. Jenkins*, 1957, 18*s*). Even with this substantial backing and the blessing of air-drops, the hazards and misery of canoe and jungle work still called for all that pertinacity which we

have come to associate with French explorers. All the more sad, then, that this book does not do it justice. The writing of travel books has become an exacting task, but anyone starting with the Orinoco has an initial advantage. Nevertheless, the reader today must have good maps (that on page 18, for example, is a disgrace) and the style must convey something of that excitement of discovering new country which alone keeps the explorer going in the moments of wretchedness. By these standards Grelier's book comes out badly, although the expedition was a notable one.

There is probably no sub-continent more photogenic than South America, not only its scenery, but also its people and artefacts. H. Mann's SOUTH AMERICA (*Thames and Hudson*, 1957, 50*s*) exploits this quality to the full and the plates are magnificent, but it is a pity that they and the explanatory legends are segregated. The book falls between two stools; it is not entirely a picture book, but the information it offers is irritatingly incomplete. If it spurs the reader to learn more about South America and, better, to visit it before its rapid development obliterates most of its unselfconscious Iberian charm, it will have served a good purpose.

There is one small point. The trees in plate 26 "introduced during the colonization" look suspiciously like *Eucalyptus*, introduced no more than about eighty years ago from Australia and now a major source of timber in the highlands.

PETER BELL

It is always good to read H. W. Tilman. This time, in MISCHIEF IN PATAGONIA (*Cambridge U.P.*, 1957, 21*s*), it is good to meet him on new ground, or I should say water, for over half the book is concerned with the journeys of *Mischief*, a 45-foot sailing boat with engine, down to and through the Magellan Straits, then up among the inlets of Chile. This "venturesome voyage," as it is even in modern times, was followed by the first crossing of the Patagonian ice cap, over to Lake Argentino and then back to the waiting *Mischief*. The party continued slowly up the west coast and returned through the Panama Canal. An amphibious operation of this sort gives full scope to a *penchant* for discomfort: Tilman seems to have chosen the worst weather in the world. It also allows play to a keenness of humour and observation which we have come to expect, and which is, if anything, the better for mellowing. In short, this was a serious venture calling for a combination of marine and mountaineering qualities which only Tilman of the party possessed (hence some of the difficulties). The account of it makes spicy reading and fills one anew with admiration for the perpetual youth of its author.

FORBIDDEN JUNGLE is a straightforward tale of Ross Salmon's attempts in 1956 to penetrate the land of the Motilon Indians living on the forested ridges that border Colombia and Venezuela (*Hodder and Stoughton*, 1957, 17*s* 6*d*). This is a good adventure story (I had almost said "yarn") breezily told, with a slight tang of Childrens' Hour T.V. about the telling. The attempts needed determination, and this the author demonstrates that he has. After one abortive effort with a cameraman, which was bogged down in thick jungle, he reached the Dobokubi (large Motilon) and was repulsed. He then went round another side and approached, with the assistance of a missionary, by way of the Yuko (small Motilon). The Dobokubi, however, again drove him out after a very short stay. There are plenty of flies, bows and arrows, matted jungles, hardships and tribal customs up and down the expedition.

WILFRID NOYCE

AUSTRALIA

THE ABORIGINES OF ARNHEM LAND

The three books under review represent the fruits of years of experience among the aborigines of the Northern Territory of Australia, and each is as distinctive in content and style as the three authors are different in character and outlook.

Wilbur Chaseling, author of YULENGOR (*Epworth Press*, 1957, 21*s*), went to eastern

Arnhem Land in 1934 as a missionary, and over the years he has accumulated a wealth of information about aboriginal beliefs and customs in that area. His book is a most interesting, systematic report on the subject and has a long introduction by Professor A. P. Elkin. The approach is anthropological rather than geographical; we are told all too little about Arnhem Land itself or about the author's views on the problems facing the aborigines today.

W. E. Harney has spent most of his sixty-two years in northern Australia, and LIFE AMONG THE ABORIGINES (*Hale*, 1957, 18*s*) is his fifth book. It is ostensibly an account of his travels around the Northern Territory between 1940 and 1947 as a Patrol Officer of the Native Affairs Branch, but this itinerary serves, in fact, merely as a framework on which to hang, often by the most tenuous of threads, a mixed collection of reminiscences of the author's earlier adventures, snippets of history and aboriginal legends. The result is at once fascinating and infuriating.

Syd Kyle-Little represents a younger generation of Native Affairs Patrol Officers and his book describes his experiences on a series of patrols in Arnhem Land between 1946 and 1950 (WHISPERING WIND, *Hutchinson*, 1957, 18*s*). He recounts his many adventures with modesty and in a vigorous, straightforward style, enlivened by touches of humour and some picturesque dialogue in pidgin and Australian. There is more to it than hairbreadth escapes and hardships, however. One patrol involved a north-to-south crossing of the difficult, unexplored country behind the sandstone escarpment that runs from east to west across the reservation, south of the coastal lowland. His first venture into this "debil-debil" country, at the end of the dry season, nearly cost the author's party their lives, as water was not to be found. The crossing was made in the wet season, two years later, with the rivers so full that several gorges could only be negotiated by swimming. On another occasion Kyle-Little accepted a challenging invitation to see the country as the aborigine sees it and went on a long "walkabout" without benefit of boots, clothes, mosquito net or rifle. When the mosquitoes became troublesome the party plastered their bodies with mud and baked it hard before a fire. "It may sound primitive," says the author. "It damn well was!" He came through the experience to the complete satisfaction of his hosts, even stalking and spearing a wallaby on his own. Mr. Kyle-Little is clearly entitled to speak with authority on aboriginal problems and his criticisms of official policy and missionary activities deserve close attention. So, too, do his suggestions on how the Arnhem Land tribes may be saved from the degradation of detribalized life in the "contact areas" and of the third-class citizenship that is all that Australia has hitherto vouchsafed its native race. All three authors make it clear that these remarkable people are worthy of something better.

All three books have many interesting photographs and all deserve far better maps than they have been given. J. S. DUNCAN

POLAR

THE PLANKTON OF THE BEAUFORT AND CHUKCHI SEA AREAS OF THE ARCTIC AND ITS RELATION TO THE HYDROGRAPHY. Arctic Institute of North America: Technical Paper No. 1. By MARTIN W. JOHNSON. *Montreal: Arctic Institute of North America*, 1956. 6¼×10 *inches; 32 pages; maps, diagrams, tables.* $0.50

Last year the Arctic Institute of North America began a new publication series under the heading of *Technical Papers*. This series is meant for papers which are too long or too technical for the average journal. Professor Johnson's account of the plankton of the Beaufort and Chukchi sea areas is the first paper in the series. It is based on material collected by the U.S.S. *Burton Island* during the summers of 1950 and 1951. The copepod crustaceans, which formed much the larger part of the plankton, are considered in one part of the paper and the miscellaneous plankton in another. Thirty-three species of copepods were taken, the number of stations being adequate

for a description of their numerical abundance and distribution. Furthermore, Professor Johnson was able to draw some conclusions regarding water movements from the distribution of certain forms. There is still much we do not know of biological conditions in the Arctic Ocean. This paper is a most welcome addition to our knowledge. As Professor Johnson remarks ". . . much research is needed to evaluate the potentialities and variabilities in the Arctic marine fauna." N. B. MARSHALL

ARCTIC TRAVEL

Captain Mike Banks, an officer of the Royal Marine Commandos and a well-known mountaineer, led a Weasel team on the British North Greenland Expedition (1952–4). He has written, in HIGH ARCTIC (*Dent*, 1957, 25*s*) what he describes as "a running commentary on the expedition as it went along" from the first landing of the Weasels on a remote part of the east Greenland coast to their final delivery at base camp in Dronning Louise Land. Their task of ferrying scientists and equipment completed, Captain Banks and his party successfully coaxed a much battered vehicle across 600 miles of ice cap and entered Thule airbase in triumph in an American helicopter. Lieutenant Angus Erskine contributes chapters on dog training and an account of the news-making crash of the R.A.F. Hastings aircraft. There is nothing remarkably new here, but it should appeal to those interested in the psychology of arctic living. The pent-up atmosphere of base camp during the second winter of a large expedition is well conveyed; "whereas major set-backs are accepted philosophically it is the small personal annoyances that nag." The sketch-maps are clear and most helpful, though in the interests of accuracy Sabine Øy should be added to map No. 7.

From mid-July to mid-August the fjord region of north-east Greenland enjoys unusually temperate weather; what is normally a desert becomes an oasis of life and colour. Mr. Ernst Hofer, a professional photographer in the service of the Swiss Federal Topographic Service, has accompanied Dr. Lauge Koch on four of his Greenland expeditions and has been bewitched by the variety and beauty of landscape, flora and fauna. ARCTIC RIVIERA (*Berne: Kummerley and Frey*, 1957) is a superb collection of photographs, some exquisitely coloured, in which the author and his associates have succeeded in conveying much of the magic of this remote and unspoiled region. It would be an invidious task to single out particular examples of praise; teachers of glaciology and geology will find here classic examples of glacier tongues, "pingos," icebergs and rock structure. There is a list of cameras, films and papers used for the benefit of enthusiast photographers and the whole is accompanied by an explanatory text.

MEN AGAINST THE FROZEN NORTH, by Ritchie Calder (*Allen and Unwin*, 1957, 16*s*) is about the Canadian Arctic. With the backing of the *News Chronicle*, the cooperation of the Canadians and a measure of "Calder's luck," the author was enabled to travel over 40,000 miles in the Canadian northlands during the spring of 1955. A carefully preconceived plan carried out with enormous energy and initiative enabled him to gain a first-hand impression of the processes transforming this vast area. Travelling by aircraft, helicopter, Weasel and dog-sledge he interviewed trappers and prospectors, "mounties," and doctors; toured uranium mines and experimental farms; tasted the life of a Hudson's Bay Company's post and an Eskimo village; he even found time to attend the Royal Canadian Air Force's arctic survival course ("If you survive you've passed"), to fly over the North Pole and visit the meteorological stations of the northern archipelago. Though necessarily hurried and superficial this is nevertheless a first-rate piece of journalism aimed at educating world opinion on the fundamental facts about an area concerning which so many misconceptions exist. The burden of Mr. Calder's message is that the North is not the frozen figment of popular imagination but an area capable, with the aid of newly developing techniques, of yielding enormous bounty, agricultural as well as mineral, to the rest of the world. Even more does he look forward to an era of settlement, when the immigrant calls in his family

from the south, sends his children to the local school and begins to cultivate his garden—even if the topsoil has to be imported.

A different approach to the same inhospitable land is to be found in ARCHIBALD THE ARCTIC (*Hodder and Stoughton*, 1957, 25*s*). The administration of a diocese covering some one-and-three-quarter million square miles of arctic Canada whose seven thousand Eskimo parishioners are constantly on the move, demands an unusually high degree of personal devotion and resourcefulness. The late Archibald Lang Fleming had these qualities and more. This is the story of a man whose life was "a compound of organization, adventure and evangelism," who left the security of a naval architect's office in Clydebank to preach the Christian message in remote Baffin Island. The generous hearts and intelligent minds of the Eskimo quickly endeared them to the novice, and they, his "spiritual children," came to accept him as "In-nook-tau-kaub"—one of the family of Eskimo. The years passed and Fleming rose to become first bishop of the Anglican diocese of the Arctic. In this office he campaigned indefatigably for the welfare of a race threatened with all the moral and physical dangers inherent in the lightning advent of a technological civilization. Today over 82 per cent. of Canadian Eskimo claim allegiance to the Anglican Church; well-equipped schools and hospitals, mission houses and churches have sprung up as witnesses to forty years of devoted work. His contribution to our understanding of the Eskimo, as a people in no way inferior physically or intellectually to their mentors, is immeasurably great. No brief summary of this autobiography can do it justice; as he himself paraphrased his own career it is "sometimes very thrilling, sometimes surprising, sometimes disappointing, but always revealing and rewarding."

H. G. R. KING

ANTARCTIC TRAVEL

EXPEDITION SOUTH and TWELVE CAME BACK are both records of a year's experiences on two of the semi-permanent stations in the Antarctic; the British station at Hope Bay in the Falkland Island Dependencies, and the Australian station on Heard Island. They are written by young Englishmen who had already crowded an unusual amount of adventure into a short span and were eager to find as much more as the Antarctic might offer. W. Ellery Anderson, author of the first book (*Evans*, 1957, 18*s*), had been a regular army officer for fourteen years before a casual inquiry for a job on an expedition, any expedition, led him from the Royal Geographical Society to the Falkland Islands Dependencies Survey (F.I.D.S.). Four months later he landed from the *John Biscoe* at Hope Bay, in Graham Land, as magistrate, justice of the peace, postmaster, base leader and meteorological observer. There were eleven other men in the party: a doctor, five meteorologists, two surveyors, a dog physiologist, a wireless operator and a diesel mechanic. EXPEDITION SOUTH is his account of how they settled down, worked and played during the year they spent on Trinity Peninsula. There may be minor inaccuracies, and perhaps some of the tales are embroidered, but the result is an eminently readable book and a first-class introduction to "F.I.D.S." Hope Bay provides opportunities for extensive sledge journeys and the second part of the book is largely an account of those made during the 1955 season. Most sledge diaries make dull reading, but Major Anderson is able to enliven his with descriptions of fantastic phenomena seen in Prince Gustav Channel. Thousands of whales, Rorqual and Killers, had been trapped in pools in the ice 70 miles from the open sea, and there they swam around harmlessly with fur seals, normally their prey. On the return journey the party found most of the whales gone and thousands of the fur seals dead and dying from some still unidentified disease. Two of the party also had the unusual and unpleasant experience of being savaged by sledge dogs. On separate occasions they fell down crevasses and were holding on with just head and shoulders above the ice, when they were attacked. The book contains a number of good photographs and two comprehensive end maps.

Judging by the biography on the cover of TWELVE CAME BACK (*Hale*, 1957, 18*s*) Peter

Lancaster Brown must remember his year on Heard Island as one of acute confinement. The island is only 27 miles long and 12 miles wide and presented few challenges worthy of his mountaineering capabilities. However he made the best of what was there and describes his adventures pleasantly. The maps are small and indistinct, and the photographs are undistinguished.

L. M. FORBES

QUEST FOR A CONTINENT (*Secker and Warburg*, 1957, 30*s*) is an intelligent man's guide to the Antarctic with particular emphasis on the part played by the United States in its exploration and scientific exploitation. As special correspondent of the *New York Times* on three Antarctic expeditions, Walter Sullivan is well qualified to handle his brief, and succeeds, in spite of the historical, political and scientific complexities, in presenting the reader with an account that is well informed, free from bias and entirely readable. There are over-many histories of Antarctic exploration and the author has wisely not detailed the exploits of the early explorers but has highlighted postwar developments. His chapters on the United States Navy's "Operation Highjump," and "Operation Deep Freeze" gain added interest from the fact that he was an eyewitness on both occasions. Most forcibly does his narrative bring home the revolution that has taken place in polar exploration in this era of government sponsored expeditions equipped with huge icebreakers, long-range aircraft, helicopters, tracked vehicles of all kinds and living accommodation with all the amenities of civilized life. Against these highly mechanized operations it has been facetiously remarked "the Antarctic never stood a chance"; an unjustifiable quip, since, as these chapters so vividly demonstrate, exploring a continent in the grip of an ice age still presents formidable obstacles.

H. G. R. KING

PHYSICAL GEOGRAPHY

LE CIEL ET LA TERRE. Tome III, Encyclopédie française. Edited by A. DANJON, P. PRUVOST, J. BLACHE. *Paris: Larousse*, 1957. 12×10 *inches; 452 pages; plates and diagrams*

It is not possible to review a book of this sort adequately unless each section is treated separately as a specialist article. There are thirty-six authors contributing to this work, each of whom is an authority. Geographers will find the volume of interest, and often of no small value as a work of reference. Baulig, Birot, Blache, Glangeaud, Gougenheim, Guilcher, Labrouste, Pardé, Perpillou, Pruvost, all write long sections, and their work and style are sufficiently well known to their colleagues in this country to need no further comment here. The section on "The heavens" is equally complete, and the list of contributors makes it quite clear that it is a volume of merit. The treatment is typically French, and the presentation of those parts in which geographers are primarily interested is comprehensive. All articles are illustrated with clear diagrams and photographs insofar as they are relevant. In Pardé's chapter it would not be unfair, and certainly not uncomplimentary, to say that it is in one sense a résumé of his work 'Fleuves et rivières.' A somewhat similar statement might be made of Guilcher's contribution on "Coastal morphology."

In some ways it is perhaps a pity that 'Heaven and Earth' are in one volume. Each could easily be expanded into a separate one, and such an arrangement might be an advantage to the prospective purchaser, since the reader interested in the Earth will not necessarily want the part dealing with the Heavens, and vice versa—the cheapest price being 7450 francs! The binding is a form of loose-leaf, and is convenient in allowing easy opening and the addition of any new maps, etc. Many geographical libraries will find it a useful reference book and students will appreciate the concise summaries.

J. A. STEERS

L'ÉROSION DES CONTINENTS. By J. BOURCART. *Paris: Armand Colin*, 1957. 6½×4½ *inches; 216 pages; diagrams*

This is an interesting and readable book. It is also provocative, and should be in the hands of all physiographers of whatever standing. The key to much of Bourcart's

theme is given in his preface: "Mais dans ce petit livre, je n'ai pas pu résumer la masse énorme des travaux antérieurs, j'ai simplement essayé de rechercher la part d'incertitude que comportent les explications classiques et tenté de montrer comment on pourrait arriver à mieux." The chapters are devoted to fluvial erosion, glacial erosion, the effects of gravity movements, the ways in which the rocks are "prepared" for erosion, wind action, marine erosion, and the classification of the materials transported. There is a summary chapter, and also, at the beginning of the book, one on the methods of morphology. Bourcart in his various themes discusses the results reached by geologists and geographers, and then, as far as possible, those of the physicists and engineers. The reader will find in addition to standard works, that reference is made to, *e.g.*, Surell whose work led Haug and others to formulate various "laws of erosion." He is, too, somewhat critical of W. M. Davis, and rightly calls attention to the classic work of de Lapparent. The reader may not always agree with the author, who has his own views, *e.g.* on the marginal deformation of the continents (see his 'Les frontières de l'océan,' 1952), and maintains that great extents of the continental shelf are submerged structural plains. Sedimentation is treated in some detail, and the processes of erosion appeal strongly to the author, who is by training an engineer. It is, indeed, refreshing to have the views of one not primarily trained in physiography. This perhaps is most noticeable in the chapter on fluvial action in which some mathematics are introduced.

The student of geography will find in this volume much that is not only of very direct interest to him, but also a point of view and a presentation that should help him in his work by causing him to think about and criticize many accepted views. It is in no sense iconoclastic, but a valuable corrective to the too ready acceptance of stereotyped opinion. The reference to the great storm and coastal flooding in the North Sea is given as 1954 instead of 1953. J. A. STEERS

GÉOLOGIE SÉDIMENTAIRE: LES SÉRIES MARINES. By AUGUSTIN LOMBARD. *Paris: Masson*, 1956. 11½×8 *inches; 722 pages; plates and diagrams*

GEOLOGISCHES KRAFTSPIEL UND LANDFORMUNG. By A. WINKLER-HERMADEN. *Vienna: Springer*, 1957. 10×7 *inches; 822 pages; maps, plates*

GEOLOGICAL HISTORY OF THE NETHERLANDS. Edited by H. D. M. BURCK and others. *The Hague: Government Printing Office*, 1956. 11½×8 *inches; 148 pages; sketch-maps and photographs. Fl.* 14.80

The first two of these three works are truly monumental in both subject matter and in the treatment thereof, but they differ considerably in their range of potential interest for the geographer. The first, as its title suggests, is a study of the sedimentary rocks, not as a text-book of stratigraphy but rather as an examination of the various factors which govern or effect the processes of sedimentation. Accepting as a principle that the same genetic factors are operative today as in the past (albeit they have varied in the extent and in the intensity of their operation) the initial section deals with the shape of the ocean basins, the configuration of the ocean floors, and physical properties and movements of sea water. It thus constitutes a clear summary of much basic oceanography. The section is concluded with a consideration of the types of deposit now being formed. The second section details the mineral composition and types of stratification to be met with in existing rocks, as distinct from rocks in the process of formation, whilst in the succeeding section the rhythms or sequences shown by assemblages of sedimentary rocks are detailed, classified, and illustrated. Thus, one such sequence is that of grain size shown by certain detritic rocks and amongst many examples is one from the Molasse; the clay, anhydrite, common salt, potash sequence shown by certain evaporatic rocks is another, and an example is given from the Zechstein. The final of the four sections into which the book is divided is concerned with the genesis of sedimentary series, and inevitably the discussion of such topics as geosynclines and the formation of the Flysch is of interest to the geographer. In other words, for the physical geographer

the first and fourth sections are of more immediate relevance; for the geologist the whole work is of importance.

'Geologisches Kraftspiel und Landformung' is primarily a most detailed examination of certain geological problems in relation to the eastern Alps. These problems are grouped into (*a*) stratigraphical, (*b*) tectonic, (*c*) the relation between volcanism and tectonics, (*d*) the relation between sedimentation and tectonics, (*e*) morphology. In group (*a*) come such questions as in the boundary between the Oligocene and Miocene; the boundary between the Pliocene and the Quaternary; the separation of Miocene and Pliocene on the Mediterranean side of the Alps. In group (*b*) come such questions as: the relative strength and duration of the Alpine earth movement; the continuity or discontinuity of the orogeny. In short, notwithstanding the obvious interest of such themes, the subject matter (especially in view of the very detailed treatment) is intended in the first instance for the geologist, preferably the Alpine specialist. The questions comprising the fifth group are, however, in a different category for they include a consideration of the age and development of the gipfelflur and high surfaces of the Alps, and are therefore of importance for the geographer. Furthermore, in view of the interest that these high surfaces and summit planes have held for many of the more eminent thinkers in the science, a discussion of the surfaces becomes inseparable from a discussion of some of the theories of landscape development, and the value of the whole to the geomorphologist in this country is enhanced. It will at least become apparent that, despite the stimulus to the study of processes given by W. Penck, German geomorphology is very far from being completely "penckian."

The third volume has a simpler intent. It is meant as a companion to the 1 : 200,000 geological map of the Netherlands, and sets out clearly and succinctly, without any superfluous detail, the necessary stratigraphical descriptions, followed by a short section on tectonics. Some half of the stratigraphical description is of course concerned with the Quaternary and will be of use to both the glaciologist and the botanist; for example, the pollen diagrams obtained from peats of Eemian age. As a whole the volume should be an additional reference for the teacher of regional geography for it considerably assists in gaining an understanding of the distribution of the mineral resources of the Netherlands, and of her soils.

E. M. YATES

CLOUD STUDY. A Pictorial Guide. By F. H. LUDLAM and R. S. SCORER. *London: John Murray*, 1957. 9½×6 *inches;* 80 *pages; photographs and diagrams.* 12*s* 6*d net*

The basis of this book is a selection of photographs preceded and accompanied by explanatory text, from the fine collection of the Royal Meteorological Society, the files of its monthly periodical *Weather* and other sources, including the private collections of the authors themselves who are expert cloud photographers and have added much to our knowledge of the subject.

All the familiar types of cloud *stratus*, *cumulus* and *cirrus*, and those whose names are compounds of these, are illustrated, but certainly there is no more striking picture than the one showing the mighty wall of cumulo-nimbus cloud surrounding the clear "eye" of a tropical cyclone. This photograph was taken from aircraft at a height of 5 kilometres in the eye of a Western Pacific typhoon.

A particularly useful inclusion as a help towards identification is a picture of the rather rare but peculiarly beautiful nocti-lucent clouds which appear sometimes in the higher northern latitudes on summer nights between May and August. These form high up at about 80 kilometres in the stratosphere, have a cirriform pattern and are probably formed of small dust particles instead of water droplets.

The authors explain very clearly that large cumulus clouds, which are formed by convection currents, change into showery cumulo-nimbus when their summits composed of super-cooled water-droplets freeze into ice particles, often with formation of anvil-shaped cirrus. Yet there is more to learn about cumulus clouds. What is the critical factor which gives them their sharp outlines and rock-like solidity of aspect notably when seen massed along the horizon like a majestic range of mountains?

L. C. W. BONACINA

HUMAN AND GENERAL GEOGRAPHY

THE GEOGRAPHY OF AIR TRANSPORT. By K. R. SEALY. *London: Hutchinson's University Library*, 1957. $7\frac{1}{2} \times 5$ *inches; 207 pages; maps, diagrams.* 10s 6d

This book is the third of an excellent series on transport. Mr. Sealy introduces his subject with a discussion of air age maps, and moves on to consider the control exerted on aviation by physical geography and the limitations of aircraft in use. The economics and technicalities of different forms of air transport are discussed fully, and are followed by separate chapters on World, European and North American routes. These are considered in relation to population distribution, national incomes, aircraft performance, etc. The chapter on "Air transport in under-developed areas" is, in fact, devoted to Canadian developments. Its usefulness might well have been increased by shortening the work on Canada so as to include other sample regions such as desert and tropical forest, enabling the effects of, say, three differing geographical environments to be seen on air route development.

The illustrations suffer inevitably from the small size of the book, but are appropriately chosen and well drawn. Clarification of the frontispiece map could be achieved by the omission of grid lines across the continents and by trimming them back slightly where they cross air routes. Figure 8 could also be clarified by suitable trimming of crossing lines. Minor criticisms include the omission of a date from the map of world air routes, one or two map key and bibliographical errors, and an error of fact on zenithal projections.

Throughout his text, Mr. Sealy states his general principles clearly and concisely, and then elaborates them by detailed references to examples. He gives numerous details and tables on the economics of air transport (all of which repay further study) without straying far from his geographical themes. In spite of its limited size, this book forms a highly comprehensive reference for university level geography and economics, and for Institute of Transport examination work. F. V. BOTLEY

LES MARCHÉS DES MATIÈRES PREMIÈRES. By J. GOTTMAN. *Paris: Armand Colin*, 1957. $9 \times 5\frac{1}{2}$ *inches; 435 pages*

The major part of this work deals separately with a series of commodities and the various sections have a similar form. Emphasis is placed on global problems, national production and consumption levels, and the pattern of world trade. The current market situation is discussed in the light of past trends and fluctuations. Much material from United Nations publications and American state documents such as the Paley Report has been incorporated and the problems of raw material supply for the future are carefully evaluated.

The analysis is thoroughly realistic and the author provides a guide through the maze of restriction schemes, long term contracts, farm support programmes, cartels and other forms of "interference" with a free market economy. Detailed information is also given on the practice of recovery of scrap and used metals of all kinds. This corrects a deficiency in much existing literature and will be appreciated. Physical conditions influencing primary production and factors in the location of certain industries get very brief discussion.

Chapter 2 deserves special mention. Here the writer considers the concept of a market and the forces that influence the location of commercial centres. The functions of storage and redistribution and their links with various types of auction and futures markets are examined. This provides a tantalizing glimpse of a largely neglected problem, but is not really followed up in the remainder of the book.

The final chapter discusses the conservation of resources, international economic planning and "Malthus and the distribution of raw materials." It includes some sensible remarks on statistics of mineral reserves and the interesting view that the best conservation is constantly improving technology. The author is generally on the side of the optimists in these controversial issues.

This is a difficult book to use, except as a reference work for a specific commodity. Otherwise the reader must work through 400 pages of text containing much that is familiar, with no maps, graphs or pictures, few tables and no footnotes or index. This is unfortunate for, while the work is not itself an economic geography, much is included that is useful, if not essential, ancillary reading for the economic geographer.

J. E. MARTIN

NORTHWESTERN UNIVERSITY STUDIES IN GEOGRAPHY, NO. 2. Malcolm Jarvis Proudfoot Memorial Volume. *Evanston, Illinois*, 1957. vi+140 *pages; maps and illustrations.* $4.00

This volume has a double claim on the attention of British geographers. It is a memorial volume, opening with a succinct and informative notice of the interesting and varied career of an American geographer who had especially close connections with Britain and with Oxford, where he died suddenly in 1955.

The volume also contains eleven short papers, of which ten are on special topics in regional geography. It argues a remarkably sane and balanced direction of this body of research that practically all of the subjects here assembled are of general interest. Even the sole one concerned with the United States ("Localization of the rubber industry in Akron, Ohio") would interest most geographers in most parts of the world. Whether by design or accident four papers concerned with Great Britain are included. Probably the most useful is J. F. Hart's "Recent changes in British agriculture," concerned with the period 1936–53. His concluding map of agricultural change by regions is interesting, though somewhat vitiated by the need to use county units, and some would quarrel with his complaint about "complete inadequacy of climatic—especially temperature—data for upland stations" (p. 95). H. G. Roepke's account of the history of British iron ore supplies is a useful summary, and K. Thompson gives an interesting discussion of the role of grassland in the Fens.

In many ways the last paper has potentially the most general interest, but its subject is effectively concealed by the title "Verification of a location model," and this obscurity is intensified by the introductory paragraph. The persistent reader will find an attempt to apply a statistical test to von Thünen's theory of zones of agricultural land values round a market centre, allowing for the complicating factor of the quality of road connections from the farm. One regrets the growing divergence in usage between English and American technical language. This has already reached the point where a rather technical article may if it is, as in this case, written in peculiarly American language, be almost unintelligible to the English reader. Words such as "concept," "procurement," "to approximate" are unfamiliar or have unwonted meanings, while "pertinate" is merely tiresome. Unfortunately, in this paper the incomprehensibility of the conclusion is ensured by the misprinting of a crucial line of text in the next to the last paragraph.

A. F. MARTIN

LEHRBUCH DER ALLGEMEINEN ZOOGEOGRAPHIE. By F. A. SCHILDER. *Jena:* VEB *Gustav Fischer Verlag*, 1956. 9¼×7 *inches;* viii+150 *pages; maps and diagrams. DM.*11

Probably every teacher of animal geography has felt at some time that his lectures, if written up, would be a useful addition to the already large number of works available on this subject. Professor Schilder seems to have acted on this idea in a singularly direct way. He has given us a book which must surely be a detailed set of his own lecture notes, and has little in common with the standard treatise consisting of a series of essay-chapters. He makes his points and classifies his information under headings, sub-headings, sub-sub-headings, etc., so that all the angles and facets of this many-sided subject are touched upon, labelled; and popped into their appropriate pigeon-holes. But then Professor Schilder is a taxonomist and it is not surprising that in conception and method, as well as in content, his book bears the stamp of the taxonomist's approach to the subject.

The author has adopted a novel arrangement which adds much to the book's value as a reference work. Following the main text, which surveys the whole field in the note-book style described above, there are forty-four pages of examples illustrating specific points made in the text. As an alternative to footnotes, or to burying the examples in the text, this method is a success and makes for clarity. Over half these examples are used to illustrate that section of the text where Professor Schilder develops his ideas on the important distinction between the dynamics and statics of zoogeography, so well expressed by the German "Ausbreitung" and "Verbreitung." His examples are chosen from mammals, molluscs and insects in particular but most groups are represented. It is a pity, however, that the accompanying maps are often too small and their labelling too indistinct to be easily understood or reproduced.

This is a valuable, perhaps an indispensable, work for students of animal geography. Yet by its very nature such a formally schematic work could never be interesting or exciting, and therefore it must disappoint all readers who have ever been captivated by the fascination of zoogeographical problems. What is lacking here is that Professor Schilder fails to take sides in, or even to give an account of, the great controversies which have enlivened and enriched the subject. He is content to explain certain patterns of distribution by Wegener's drifting continents, but he uses this interpretation without discrimination. He extends it in particular to account for certain Tertiary mammalian distributions, *e.g.* tapirs, which are satisfactorily explained without postulating any continental movements. The absence of any reference to W. D. Matthew's 'Climate and Evolution' and the failure to include Matthew's method of depicting distributions on a north polar projection in the section on such methods, makes one wonder how closely Professor Schilder has followed the argument on zoogeography and global history on which there is such an extensive British and American literature. It seems, therefore, that Professor Schilder has given us an excellent outline of the materials going into the zoogeographer's mill without introducing us to the lively mixture that comes out. Evidently *the* book on zoogeography still remains to be written.

D. M. Ross

COLLECTION OF MAPS AND DOCUMENTS SHOWN AT THE EXHIBITION HELD IN THE PALAZZO VECCHIO IN FLORENCE ON THE QUINCENTENARY OF THE BIRTH OF AMERIGO VESPUCCI. *Florence: Leo S. Olschki*, 1954–5. 12½×16 *inches;* 16 *pages;* 34 *plates* (16 *in colour*). *Lire* 20,000

In 1954–5 an exhibition was held in the Palazzo Vecchio, Florence, to mark the 500th anniversary of the birth of Amerigo Vespucci. The civic authorities have since published, in an Italian and an English edition, a handsome volume of reproductions, many in colour, of some of the notable documents and maps displayed on that occasion. The theme is "Vespucci and America" and the items have been chosen for their artistic merits as well as for their historical importance. The true status of Vespucci and his precise achievements have been, and still are, the subject of lively discussion. The editor of this volume in a brief introduction and biographical note puts Vespucci's claims firmly but in relatively moderate terms. Vespucci is presented as the first to recognize that the discoveries in the west constituted a "New World," and as a first-class navigator whom the Spanish sovereigns later appointed Pilot Major. On the precise number of voyages Vespucci made and their extent the editor is silent, but considers that there was ample justification for bestowing the name America on the New World.

The documents reproduced include a letter in which Columbus pays a tribute to Vespucci; the Royal order conferring the title of Pilot Major upon him, and pages from the publications which made his name known throughout Europe. The map facsimiles, which form the bulk of the plates, have been chosen for their bearing upon Vespucci's career, and to illustrate the early development of the map of America. A number of these items are very large, some over 6 feet in breadth, so that the reduction

has been considerable. The nomenclature therefore is largely illegible. However, the colour printing is excellent, except perhaps in one instance, so that they give a striking impression of early sixteenth century cartographic art, which black and white reproductions fail altogether to convey. Among the colour reproductions are three planispheres, all dated 1502, and known as the "King-Hamy," the Caveri (formerly Caneiro) and the Cantino maps; charts of the Atlantic by Visconte Maggiolo 1512, and Jorge Reinel 1536; and a sheet of the Lopo Homem atlas, 1519–22.

Some of the items are not easily accessible in facsimile, and it is very convenient to have so many important pieces brought together in a volume of moderate dimensions. If they are not all suitable for detailed study, they demonstrate very effectively the evolution of the world map during a crucial period in its history. The editorial work is confined to a minimum; some of the documents are transcribed, but the annotations to the plates are very brief, and the English rendering is not always very happy. More details may, however, be obtained from the catalogue of the exhibition —"Mostra Vespucciana: Catalogo," edited by Dr. G. S. Martini and others, and obtainable from the same publishers.

G. R. CRONE

THE DESERT AND THE GREEN. By THE EARL OF LYTTON. *London: Macdonald*, 1957. 8½×5½ *inches;* 350 *pages; plates.* 25*s*

This is a delightful autobiography of an English gentleman. The author's father was a talented younger son, who succeeded through tragedy and war. His mother, the Baroness Wentworth, was the daughter of Wilfrid Scawen Blunt, the Arabian traveller and champion of Irish and other nationalism. He passed through Downside and Sandhurst in 1918. Commissioned in a Rifle regiment his service started with the Irish troubles of the '20s. He deplores rebellion and appreciates the need for partition. Seconded to the King's African Rifles in Kenya, he was soon posted to single officer stations in the then appallingly primitive Northern Frontier Province, where camel and donkey trains, or ox waggons, took weeks to bring up supplies or reliefs. Young officers also acted as magistrates amongst the Turkana and other tribesmen, whom they had both to protect and restrain. Many died of tropical disease. Notably he tells of the Swedish Baron von Otter. Never a British subject, he fought the Germans for Britain, and was decorated for the rescue of one of his beloved Askaris. Sent for a few months to Lodwar, he died there after three-and-a-half years and at his last wish was buried under the Union Jack. The author describes the first launching of a boat upon Lake Rudolf by a naval officer sent for the purpose, and a narrow escape from the fierce wind that brought disaster to a later expedition. He himself returned after some years ridden with malaria. His studies becoming known, he was appointed Instructor in Economics at Sandhurst. Thereafter as weapon training officer, he sponsored the 1st Rifle Brigade team that won so many Army championships in the '30s. Longing for the battle experience for which an austere military life, athletics and sport had prepared him, he escaped from Staff appointments to North Africa as a potential replacement of a battle casualty. A wicked motor accident in Algiers laid him low until the fighting there was over. Then he was a senior officer of "Land Forces Adriatic." He is critical of the allied support given to Communists less anxious to get to grips with the Germans than with their own fellow countrymen. In fact, his opinions throughout the book merit the observation of statesmen. His account of Greece is equally poignant, although there he was welcomed as a descendant of Byron.

WARIS AMEER-ALI

EXPEDITIONS AND EXPLORATION

Three recent books tell the stories of expeditions in which the Society has been more or less directly interested. Oliver de Baer's AFGHAN INTERLUDE (*Chatto and Windus*, 1957, 21*s*) is an account of the Cambridge Expedition to Afghanistan in 1955, to which the Society made a grant. Oliver de Baer, an anthropologist, acted as leader,

and was accompanied by Christopher Balfour, John Start and Richard Thompson—all Cambridge undergraduates. They motored by Land-Rover to Istanbul, and through Persia to Afghanistan—where they encountered their first real difficulties. So long a buffer between Britain in India and Russia in Russia, Afghanistan has tended to be suspicious of foreigners and Mr. de Baer and his friends found that even the possession of a butterfly net could mark one down as a spy. (One remembers the excursion of Bailey and Moreshead into forbidden Tibet in 1913, armed with this incriminating weapon.) The Cambridge expedition was refused permission to penetrate the areas they had planned to visit, and had to make do with a brief, and supervised, session on the Boharak Plain. The frustrations they suffered are reflected in this book, which lacks elan, but which is nevertheless a soberly interesting account of a typical undergraduate venture. It is attractively produced with excellent pictures.

On the way back Mr. de Baer and his companions met, on the Yugoslav frontier, the Oxford and Cambridge Far Eastern Expedition, all out to be "first overland" from London to Singapore. Despite the hum of publicity which surrounded this adventure, which received a grant from the Society in June 1955, Tim Slessor has written its story in a modest and engaging book (FIRST OVERLAND, *Harrap*, 1957, 21*s*). The programme was ambitious: not only was it proposed to drive 32,000 miles in two Land-Rovers (called, of course, Oxford and Cambridge, and painted accordingly); but field research was also to be carried out on irrigation in Pakistan and on mineral development in Burma. So much was projected and such a creditably large amount of it achieved, that it has not been possible to include everything in 'First overland.' Apart from Pat Murphy's account of irrigation in the Thal desert (chapter 7) (of which the Society has received a separate report), the book sticks to the progress on the outward journey of the two cars; chapter 8 is written by Barrington Brown and deals with a stretch of the road from India into Nepal. For the rest, Tim Slessor is an agreeable guide with a feeling for history past and future. We are made aware of this when he observes H. M. Stanley's name carved on a column at Baalbeck, and later as he drives his vehicle over "Stilwell's road" through the Burmese jungle. "There was once a road through the woods" from Ledo to Myitkyina, which cost £50 a yard only twelve years ago.

Although David Attenborough's pursuit of "dragons" in Indonesia was not aided or sponsored by the Society, many Fellows will remember his 1956 Christmas lecture to children about his expedition to Indonesia and his search for the giant lizard of Komodo. ZOO QUEST FOR A DRAGON (*Lutterworth Press*, 1957, 18*s*) is a delightful book; light-hearted and yet informative, and full of charming characters—Charlie the Chimp, Benjamin the Bear, and the excellent Sabran with whom David Attenborough and Charles Lagus went animal collecting in Borneo.

DOROTHY MIDDLETON

SHORTER NOTICES

Mrs. Stuart, wife of a former Bishop of Uganda, sub-titles her excellent little book, LAND OF PROMISE, 'A story of the Church in Uganda,' but it is rather more than that (*Highway Press*, 1957, 4*s* 6*d*). She tells the history of Uganda from the discovery of Buganda by Speke in 1862, ending with an account of the consecration by the Archbishop of Canterbury of four African bishops in the cathedral at Kampala in May 1955, and the Kabaka's return from exile in the October of the same year. Mrs. Stuart succeeds in a task which is very difficult in this introspective and free-thinking age: she manages to convey the enlightenment which the Christian revelation can bring to "those who sit in darkness," and thus explains the force for progress which missionary endeavour has been in Uganda. She has a sense of history and writes very well. Her descriptions are moving of the early missionaries—Mackay, for instance, labouring in his workshop to teach to all the dignity of labour—and of such stalwarts as Bishop Tucker walking "in and out of the swamps quite cheerfully" and talking until the water began to close over his head. Speke, Stanley, Sir Harry Johnston and

the rest have their place in these pages, together with their more numerous but equally important African brothers and sisters.

Eric and Barbara Whelpton have evolved a pleasing formula for travel books—they go, they see, and they are conquered by out of the way corners of French- and Italian-speaking Europe. A knack of friendship, the artist's seeing eye (Mrs. Whelpton is the painter Barbara Crocker) and a philosophical acceptance of discomfort should ensure the success of CALABRIA AND THE AEOLIAN ISLANDS (*Hale*, 1957, 21*s*).

Monica Krippner was determined to travel BEYOND ATHENS (*Bles*, 1957, 21*s*) and to learn something of the Greek countryside and of the assorted people who live in it. Despite a pedestrian style, Miss Krippner is worth taking as one's guide to such extraordinary places as the corner of Thessaly where the "flying monasteries" of the Meteora are perched on rock pinnacles, to the Turkish market of Komotini in eastern Thrace, or to the remote Macedonian town of Kastoria where the principal trade is the making of fur coats out of scraps discarded from New York warehouses—a Persian lamb coat, made to a *Vogue* pattern, costs £26 in Kastoria.

THE PAINTED CAVES (*Phoenix House*, 1957, 30*s*) is a literary man's impression of the prehistoric paintings in the limestone caves of France and Spain. Geoffrey Grigson is a writer who invades but also illuminates many specialist fields; primarily a poet, he is something of a botanist, and here he turns archaeologist, describing vividly the strange animals and the humans, less strange than one would expect, which adorn the walls of Lascaux, Altamira and many other less well-known caves.

GREEN LIGHT FOR ADVENTURE (*Allen and Unwin*, 1957, 21*s*) was told to his countryman, Oddm. Ljone, by Gunnar Aadnesen, a Norwegian traveller and seeker after adventure. Aadnesen found his way from Lillesand to South America, via South Africa, at the turn of the century, and has some interesting stories to tell—particularly of Henry Ford's enterprise on the vast rubber estate of Boa Vista, and of wild doings in the Matto Grosso and in the depths of the Brazilian jungles.

There is a certain historical interest in KENYA DIARY (*Oliver Boyd*, 1957, 30*s*), for it covers the years 1902 to 1906 and is printed almost exactly as Colonel Richard Meinertzhagen wrote it down when serving in East Africa with the King's African Rifles. Colonel Meinertzhagen, well known as a leading ornithologist and traveller, has no apologies to make and no regrets for the life led by a young subaltern in an outpost of Empire some fifty years ago, when rough justice was more readily accepted than it is today. A book based on the diary might have made easier reading, but the form of publication chosen has the merit of actuality.

J. C. Pollock has written the life of General Sir Henry Havelock from the point of view of an Evangelical Christian. Havelock's insistence on prayer, temperance and an ordered way of life did much to ensure the success in battle of the men under his command, and his own quest for salvation can be argued to be at least as important as his relief of Lucknow. WAY TO GLORY (*John Murray*, 1957, 25*s*) is, however, more than just a tract. Mr. Pollock writes well and unpretentiously and gives us a lively and interesting picture of India in the years just before and during the Mutiny.

BIRTHPLACE OF THE WINDS by Ted Bank II, originally published in America by Thomas Y. Crowell of New York (1956, $4.50), has now been received in its first British edition from the publishers in this country, Robert Hale (1957, 18*s*). It was reviewed in the *Journal* for March 1957. DOROTHY MIDDLETON

LAWINEN! By WALTHER FLAIG. Correction

The Editor regrets that in the *Journal* for December 1957, page 548, two errors have occurred in Mr. Seligman's review of "Lawinen": *Line* 1, for 1955 read 1935; *paragraph five, line* 4: for pressure read temperature.

AMERICAN CITIES IN THE GROWTH OF THE NATION. By C. M. GREEN.

The Editor regrets that in the *Journal* for December 1957, page 543, the price of this book was wrongly given as 85*s*. The correct price is 35*s*.

THE SOCIETY'S NEWS

NEW YEAR'S HONOURS

Mr. Stephen Courtauld, Member of Council from 1935 to 1939, and from 1942 to 1944, and Vice-President of the Society from 1944 to 1946, was created a Knight Bachelor in the New Year's Honours; he has been a Fellow of the Society since 1920. Mr. L. P. Kirwan, Director and Secretary of the Society since 1945, was created a Companion of the Order of St. Michael and St. George. Dr. Julian Huxley, F.R.S., a Fellow of the Society since 1936, was created a Knight Bachelor.

AMERICAN GEOGRAPHICAL SOCIETY

The American Geographical Society's Anniversary Dinner was held in New York on 30 January 1958, and the following telegram was sent from the Royal Geographical Society:

"President and Council R.G.S. send warmest greetings to American Geographical Society assembled for Annual Dinner. We deeply appreciate cordial cooperation between your geographers and ours in present Antarctic exploration. J. H. Marshall-Cornwall."

THE TOKYO GEOGRAPHICAL SOCIETY

At the final Nara session, on 3 September 1957, of the Regional Conference in Japan held under the auspices of the International Geographical Union, the Honorary Secretary of the Tokyo Geographical Society announced that his Council had decided to award the Medals of the Society to Professor L. Dudley Stamp, immediate Past President, and Professor Hans Ahlmann, President of the Union. The medals, which have been awarded periodically since the Society's foundation, for services to the advancement of geography with special reference to Asia in general and Japan in particular, were handed over to representatives of the United Kingdom and Swedish Embassies at a ceremony in Tokyo on 9 November 1957. Professor Dudley Stamp is a Vice-President of the Royal Geographical Society.

SPECIAL MEETINGS AND FILMS DURING 1957

Meetings and films in the Society's Hall during 1957 attracted, as usual, large attendances, notably for the lecture by P. G. Mott on "Mapping Antarctica from the air," on October 21, and for the unique colour films "At the South Pole," on December 9, with commentary by Captain Richard B. Black, U.S.N.R. These films showed the establishment by air of some of the United States I.G.Y. bases in 1956. Equally noteworthy, and with the same topical interest, was the lecture on the "International Geophysical Year" by Dr. D. C. Martin, assistant secretary of the Royal Society and secretary of the British National Committee for the I.G.Y. on December 2.

The children's Christmas Lectures took place in the early days of 1958; both were attended to capacity. On January 1 Mr. Norman C. Cook, Keeper of the Guildhall Museum, lectured on "Exploring London's Past," and on the following day Mr. Peter Scott, in "Pacific Journey," showed a film of a search for birds and beasts during his recent journey round the world. Both lecturers answered many questions at the end of the two lectures they delivered each afternoon.

An exhibition of polar photographs and equipment was arranged early in the session in connection with Mr. Mott's lecture, and with the cooperation of Hunting Aerosurveys Ltd., and another to illustrate aspects of London's early history lasted from January 1 to February 17 in cooperation with the Guildhall and London Museums.

THE RECORD

CONTRIBUTORS TO THIS ISSUE OF THE *JOURNAL*

P. G. Mott is Technical Director of Hunting Aerosurveys, Ltd.: he has been on expeditions to west Greenland and won the Murchison Grant in 1940 for his work there. *Dr. D. C. Martin*, assistant secretary of the Royal Society, is also secretary to the British National Committee for the International Geophysical Year and chairman of the Advisory Committee on Publications for the I.G.Y. *Miss Freya Stark*, the distinguished writer and traveller, received the Founder's Medal in 1942. *Mrs. Dunsheath*, well known as a member of the Ladies Alpine Club, was the leader of the Abinger Himalayan (all-woman) expedition of 1956. *Dr. Donald Wood*, at the time of the expedition to North Borneo, was a demonstrator in the department of geography at Cambridge; *Brian Moser* is an undergraduate member of Trinity College, Cambridge, where he is reading geography. *H. J. Savory* is a senior lecturer in geography at Borough Road College, Isleworth; he has paid two visits to Yugoslavia to study land use. The late *Michael Holland* was a tutorial fellow at Bedford College, London; at the time of his death he was attached to the Danish I.G.Y. expedition in north-west Greenland, where he died in a blizzard on the ice cap above Inglefield Fjord. *Dr. Melvyn Howe*, lecturer in geography in the University College of Wales, Aberystwyth, is the first British professional geographer to visit Leningrad and Moscow since the Revolution. *J. P. Masterton* and *H. E. Lewis*, of the Division of Human Physiology, National Institute for Medical Research, London, were the doctors on the British North Greenland Expedition, and are engaged on research into polar physiology.

THE ROYAL CANADIAN GEOGRAPHICAL SOCIETY

Her Majesty The Queen has been graciously pleased to confer the title of "Royal" on the Canadian Geographical Society. This was announced after a special general meeting of the society held on 4 October 1957 with the President, Major-General H. A. Young, in the chair, and was published in the *Canadian Geographical Journal* for November 1957.

THE COMMONWEALTH TRANS-ANTARCTIC EXPEDITION

On 3 January 1958 Sir Edmund Hillary, with a party of four, arrived by tractor at the South Pole, from Scott Base, McMurdo Sound. He had previously laid Depot 700, 470 miles from the geographical Pole, in accordance with Dr. Fuchs' plans, and had reconnoitred and marked a route as far as that point. The further reconnaissance, as far as the Pole itself, undoubtedly proved of value to Dr. Fuchs on the second stage of his journey (to Depot 700), since part of the area was known to be treacherous and heavily crevassed. Sir Edmund Hillary's achievement in reaching the Pole in vehicles much inferior in quality and performance to those of the crossing party aroused enthusiasm throughout the world, and the Society commemorated this first overland journey to the Pole since Scott by sending the following telegram to him and his men:

"President and Council Royal Geographical Society send warmest congratulations your fine achievement in completing first overland journey to South Pole since Scott. Best wishes for early meeting with Fuchs and successful conclusion of Commonwealth Trans-Antarctic journey."

On January 6, after more than one abortive attempt, Squadron-Leader Lewis in the expedition's Otter aircraft made the first continuous crossing of the Antarctic continent by air in a single-engined aircraft. This was from Shackleton Base on the Weddell Sea to Scott Base on the Ross Sea. It was also the first air crossing of this kind to have been made via the Pole. The text of the telegram to Squadron-Leader Lewis from the Society and of his reply are given below:

"President and Council of Royal Geographical Society send heartiest congratulations on your great single-engined flight across Antarctica." To which Squadron-Leader Lewis replied: "My crew and I greatly appreciate your message. Thank you."

Finally, there was the arrival, after some delays, of Dr. Fuchs and the main party of the expedition at the Pole, on January 19; delays occasioned not only by the exceptional difficulty of the crevassed areas between Shackleton and South Ice, the advanced base (made worse by warmer weather which weakened snow bridges), but also by the need for stops to undertake seismic soundings and other scientific observations. The following telegram was sent to Dr. Fuchs:

"President and Council Royal Geographical Society send heartiest congratulations to you and your men on accomplishing this first stage of your great journey and your planned scientific programme in face of such unprecedented difficulties and over route never previously explored. All best wishes."

GEOGRAPHY APPOINTMENT, BRITISH COLUMBIA

The Geography Division of the Department of Geology and Geography, University of British Columbia, Vancouver, B.C., expects to have a new position of Instructor in geography open in the Fall, 1958. While awaiting budget approval of this possible position, the department welcomes correspondence from any interested persons. The new staff member will be expected to lecture in a 2nd year course in Economic Geography; a 3rd year course in World Regional Geography by continents; a 4th year course in a Regional specialty—particularly desirable would be Europe, but also possible is Latin America. Only two of these courses will be expected to be given in the Instructor's first year of appointment. In later years, as a permanent staff member, the person would take on a graduate course, perhaps in Industrial Geography. Normal teaching load is 9 to 12 hours lecturing per week. All undergraduate courses extend for the full academic year of two terms from mid-September to mid-April. University lectures are held for 25 weeks in the year; the long summer of May to mid-September may be used for research or field work. Additional pay of $800 is given for the Summer Session of 7 weeks from early July to mid-August if the staff member wishes to teach. Total university enrolments exceed 9000 students. There are 5 full-time members of the present geography staff. Salary offered will depend upon the qualifications of the applicant, and the final result of budget commitments. Expected salary should be in the range of $4400 to $5000 for the full year. Medical, hospital, retirement pension, and other benefits are available for all university faculty. Qualified and interested persons are invited to write to: Dr. J. Lewis Robinson, Chairman, Geography Division, University of British Columbia, Vancouver 8, B.C., Canada.

THE INTERNATIONAL GEOGRAPHICAL UNION—REGIONAL CONFERENCE IN JAPAN, 1957

Although work is carried on continuously by the Commissions of the Union, the Executive considered that more ought to be done to help geographers between the four-yearly Congresses, especially those working in countries distant from a main Congress centre. With the help of UNESCO the Regional Conference on Africa was held at Makerere (Uganda) in September 1955, and in that same year the Japanese geographers formulated plans for a Regional Conference in Japan. Having received the cordial blessing of the IGU Executive, but little more, the Japanese enlisted the help of the Science Council of Japan and were supported by many public authorities throughout the country. Over 130 papers were contributed to the nine sections, there were opening and closing plenary sessions, and one morning was devoted to a symposium on the geography of south-east Asia. The eighty overseas delegates came from twenty-two countries and included the President of the IGU, Professor Hans Ahlmann (Sweden), two immediate Past-Presidents, Professor L. Dudley Stamp (United Kingdom) and Professor George B. Cressey (United States of

America), and the Secretary-Treasurer, Professor Hans Boesch (Switzerland). There were over 300 Japanese geographers, including the Chairman of the National Committee, Professor Fumio Tada (Tokyo) who is also a Vice-President of the Union.

The Opening Session was held on Thursday, August 29, in the Yasuda Hall of the University of Tokyo with welcoming addresses by the President of the University, Minister of Education, President of the Science Council of Japan and by Professor Tada. On Sunday the Conference transferred by rail to Tenri University, Nara, over 300 miles away, and there enjoyed the hospitality of that remarkable institution. The Conference ended officially at a reception given in Kyoto University by the President on Tuesday, September 3.

The meetings were preceded by two alternative excursions (Hokkaido and Northern Honshu) and followed by three others to central and western Japan. The guide books prepared for these excursions together form a complete regional geography of Japan—the first to be published in English by Japanese geographers themselves. Everywhere delegates were lavishly entertained in the manners of a country which almost lives two lives—of the East and of the West.

In the past, the bulk of geographical work on Japan has been published in Japanese; most of the official maps entirely in Japanese, and it may be truthfully said that much of the original and pioneer work is known only to a handful of western geographers. The Conference has done much to remedy this state of affairs and it is obviously incumbent on the overseas delegates to make more widely known the geographical work accomplished and in progress. The proceedings of the Conference were in English, now the first foreign language, and abstracts of all papers were published in that language. Increasingly it is the custom to publish summaries of work in English in the monthly Japanese Geographical Review, and in other journals as well as of books.

Amongst the fields in which Japanese geographers are particularly active are geomorphology—with special reference to the effect of recent crustal movements—land use studies designed to help in the maximum development of resources, including reclamation, climatology with special reference to the ever-present menace of disastrous consequences of abnormal conditions, settlement geography in a country still in transition from a medieval pattern to an imperfect assimilation of western industrialization. Though some of the Japanese geographers dealt with world problems, their interest is concentrated on the problems of the homeland. As a result much of the work is both detailed and penetrating in its analysis, and of special interest to those who work in the likewise crowded and old-settled countries of Europe.

L. DUDLEY STAMP

INTERNATIONAL ASSOCIATION FOR QUATERNARY RESEARCH

Some forty-two countries were represented by over 400 delegates at the fifth international congress of the Association for Quaternary Research in September 1957, in Spain. After the fourth meeting in Italy in 1953 it was reported in this *Journal* that British geographers do not seem to be sufficiently aware of the work of this body, commonly known as INQUA (*Geogr. J.* 119 (1953), p. 509). This is still apparently true as no British geomorphologist was present at the fifth congress, which was held under the honorary presidency of Professor A. C. Blanc (Rome), for seven days in Madrid and a further five days in Barcelona. Subjects ranged from geomorphology and Pleistocene geology to Palaeolithic archaeology and the problems of carbon-14 dating. A careful balance of emphasis was maintained, however, and there were three themes of general interest: regional Quaternary and stratigraphical correlations, palaeoclimatology and chronology. Over 200 papers were presented at the two sessions, grouped under eleven sections. Five commissions met during the congress, concerned with: study of the coastline; dictionary of terms used in Quaternary geology; nomenclature and correlation of the Pleistocene; recent tectonics; geological map of the Pleistocene in West Europe.

A useful report, "Subdivisions of the Pleistocene," was presented, based on a questionnaire answered by twenty-one countries. Perhaps wisely, a number of subdivisions were made in the existing commissions in preference to the creation of new ones. These will presumably be announced in the forthcoming journal of the congress, *Quaternaria*. The publications of the congress, and the transactions in due course, are obtainable from the General Secretariat, c/o Instituto Geologico, Universidad, Barcelona. The congress was remarkably successful and no report would be complete without reference to the splendid organization achieved by Professor Solé Sabarís, the General Secretary, and by his colleagues. The next congress is to be held in Warsaw in 1961. From the notable contributions already presented by its delegates, this promises to be a most important meeting. J. M. HOUSTON

THE CONFERENCE OF GERMAN GEOGRAPHERS AT WÜRZBURG

As briefly announced in the *Journal* for December 1957, the thirty-first Deutsche Geographentag was held from July 29 to 5 August 1957. Over 800 geographers from universities, schools and other walks of life gathered together; naturally most of them came from the Federal German Republic but there was also a contingent of about eighty from the German Democratic Republic (Soviet Zone) as well as guests from Austria, Switzerland, the Netherlands, Finland, Great Britain, Ghana, the United States, and Japan. After preparatory business meetings on Monday July 29, the official proceedings began on the Tuesday with a series of welcoming addresses by the chairman of the organizing committee, Professor J. Büdel, the Rektor of Würzburg University, representatives of the government of Bavaria, and the mayor of Würzburg. These were followed by two one-hour papers, the Festvortrag by H. Wilhelmy (Stuttgart), the retiring chairman of the Zentralverband der Deutschen Geographen, who communicated results of his research in the Mato Grosso, and a paper by J. Schmithüsen (Karlsruhe), who spoke on "Problems of vegetation geography" illustrated by examples from Chile, Europe and Africa. The afternoon was occupied by business meetings of the subsections of the German Geographers' Association, *i.e.* university teachers, professional geographers, and school teachers, but there was also an opportunity to visit the castle and museum with its unique Riemenschneider collection and to be guided through the Baroque architecture of the city. The proceedings of the day were concluded by a two-hour public evening lecture by H. Schlenger (Kiel) who presented a world-wide survey of the refugee problem. The remaining days, with a very full programme of papers, some in parallel sessions, lasting from 8.30 a.m., with a short lunch break, until 6 p.m., were broken by a half-day excursion (there were five to choose from) and a Mozart recital evening in the magnificent Kaisersaal of the Residenz.

Compared with former conferences a new feature was that most of the papers were arranged in themes, for which at least some of the papers had been commissioned. Because of the great number of papers read—there were about fifty altogether—only the themes and some of the papers can be mentioned. The first theme under consideration on Wednesday morning was "Erosion surfaces in the humid tropical regions"; J. P. Bakker (Amsterdam) acted as chairman and the main (one hour) paper was read by J. Büdel. During the afternoon two themes as well as a parallel session on human geography were on the programme. The latter was presided over by G. Pfeifer (Heidelberg) and W. Gerling (Würzburg) who also read a paper each on Minas Gerais and industrialization of India respectively. The first of the two themes in the main session dealt with "Fluctuations of climate during the last millennium"; H. Lautensach (Stuttgart) was in the chair and the principal paper was read by H. Flohn (Würzburg-Frankfurt). Amongst the subsidiary papers, H. Kinzl's (Innsbruck) address on the oscillations of glaciers as witnesses of climate was particularly noteworthy. The second theme was devoted to problems of cartography. It was presided over by E. Lehmann (Leipzig), the principal paper being delivered by H. Louis (Munich).

The morning of Thursday, August 1, was devoted to a single theme, the industrialization of countries which until recently were suppliers of raw materials. The chairman of this session was T. Kraus (Cologne) and the principal paper was read by A. Kolb (Hamburg).

The morning session on Friday, August 2, under the chairmanship of C. Schott (Marburg), dealt with problems of agricultural geography in Germany. In this session papers of forty-five minutes were read by E. Otremba (Hamburg) who presented a survey of the German agricultural landscape as a whole, and C. Troll (Bonn), who spoke about the Rhenish agricultural landscape. Of the remaining three short papers, only that by G. Jensch (Berlin) on labour input in German agricultural regions really belonged to this theme. In a parallel morning session A. Winkler von Hermaden (Graz) presented the results of his geomorphological investigations in northern Yugoslavia, and W. Weischet (Munich) discussed two geomorphological profiles across the southern part of the great valley of Chile. These were followed by two papers devoted to urban geography.

The final afternoon session, devoted to historical geography and presided over and brilliantly introduced by H. Mortensen (Göttingen) proved to be something like a climax of the conference. W. Müller-Wille (Münster) presented an excellent general survey of the medieval and early modern cultural landscape of Germany and its relationship to the present. G. Oberbeck (Hannover) led us back to the medieval landscape of the region between Harz and Lüneburg Heath; the north-western edge of the Harz and the vestiges of the late medieval metallurgical industry had already been discussed during the morning session by J. K. Rippel (Brunswick). The two other papers of the morning session, which would have found their proper place in the session on historical geography, were by F. Monheim (Aachen), on the development of the agricultural landscape of the Upper Rhine from the seventeenth to nineteenth centuries, and by K. Hattenbach (Jena), who reported on results of recent research into the historical geography of Thuringia. The two remaining papers of the afternoon session incorporated results of work carried out in Britain. H. Jäger (Würzburg) showed parallelisms and divergencies in the development of the rural landscape in the countries around the North Sea and H. Uhlig (Cologne) spoke about ribbon fields in north England, Wales and Scotland.

As a proper geographical conclusion, a series of excursions followed on Saturday, August 3. The three-day excursion guided by J. Büdel had as its object the drawing of a geomorphological W.–E. transect across Franconia. In it Professor Büdel had the opportunity of demonstrating in the field the work of climate-morphology being undertaken by his department and of showing convincingly that the hitherto accepted theory of scarpland formation is no longer tenable. The fifty or so papers read at the Conference are to be published in the series *Verhandlungen des Deutschen Geographentages*, Bd. 31, due to appear in 1959.

Impressive as the conference was in the picture it gave of the great activity of German (and Austrian) geographers there were nevertheless some of the shortcomings already noted at the previous conferences at Essen and Hamburg. The great number of participants and the overloaded programme made it difficult to find sufficient opportunities for informal conversation; to expect the audience to be capable of listening to sets of five papers lasting up to four hours (without breaks between the papers) was really taxing one's mental stamina beyond the point of maximum return. Still these are in comparison only minor matters and it can justly be said that the conference was a great success.

KARL A. SINNHUBER

CHOGO LUNGMA GLACIER

Dr. Wilhelm Kick, of Regensburg, has been making studies of this Karakoram glacier and is anxious to trace a painting of it made by Colonel Godwin Austen in 1861, in order to check the position of its end with its position today. Dr. Kick would be grateful for any information to help in finding this painting, and if any reader of the

Journal knows of such a picture will they write in the first place to G. Seligman, c/o The British Glaciological Society, Little Dane, Biddenden, Ashford, Kent.

EXPEDITIONS IN THE FIELD DURING 1957

Reports have been submitted to the Research Committee from expeditions to which financial and other aid was announced in the *Journal* for June 1957. Unless otherwise stated, the expeditions worked during the Long Vacation of 1957, and the full reports may be seen in the Society's library.

1. *Cambridge Tibesti Expedition.*—This expedition of members of Cambridge University (with the cooperation of the British Army 10th Armoured Division in Tripoli) consisted of seventeen men and seven vehicles, and was led by A. R. Akester. It left Tripoli in June 1957, establishing a base camp at the French military post of Zoaar and an advance base at Bardai. The expedition was self-sufficient for three months and made studies of the geomorphology and biology of the Tibesti region.

2. *Nottingham University Exploration Society's Expedition to Spitsbergen*, 1957.—Led by G. W. G. Sharp the expedition carried out a programme of geological, physiological and ornithological research in an area to the north of King's Bay in north-west Spitsbergen.

3. *University of Durham Exploration Society's Expedition to Norway*, 1957.—This was the second successive Durham expedition to Lyngen. Under the leadership of N. Aitkenhead, the field work consisted of zoological and geographical investigations as well as a continuation and extension of the 1956 expedition's geological and glaciological work.

4. *Edinburgh University Archaeological Survey Expedition: Cilicia.*—The leader, Michael R. E. Gough, reports that a programme of research on the road systems of the Late Roman/Early Byzantine periods was carried out in the Turkish *vilayets* of Sehan and Icel in the summer and early autumn of 1957. The programme in the Cilician plain had to be curtailed owing to illness, but it is intended to finish this part of the work in 1958.

5. *Central Corsican Expedition* 1957.—The expedition, led by Arthur G. Bourne, was essentially in the nature of a reconnaissance and primarily intended to concentrate on the botanical and zoological parts of the original programme. Camp was set up at the Grotte-des-Anges near Calacuccia; observations were made of the humidity, temperature and air-pressure, and collections of the local flora and fauna were assembled.

6. *Cambridge Expedition to the Colombian Cordillera Oriental.*—Led by P. J. Grubb, Magdalene College, this expedition made the first known collection of plants on the eastern slopes of the Colombian Cordillera; some 4000 plants were gathered. Several peaks were climbed, and two members of the expedition remained in Colombia to make a further study of the Tunedo Indians and to climb in the Cocuy massif.

7. *Cambridge Spitsbergen Expedition* 1957.—The party was led by P. F. Friend, Gonville and Caius College, and geological and topographical work was carried out in North Dickson Land. About a dozen theodolite stations were cairned and occupied, and a geological reconnaissance made.

8. *Cambridge Botanical Expedition, Ethiopia.*—Under the leadership of Colin Leakey, King's College, this expedition was planned as a cooperative venture with the University of Addis Abbaba. They spent a "most satisfactory summer in the Chokke Mountains" and the botanical and zoological collections have been lodged at Kew and at the British Museum (Natural History).

9. *Norsk-Engelsk-Amerikansk Teleforskningsgruppe Field Expeditions* 1957.—Field work was carried out under the leadership of P. J. Williams during the fourth and final year of a series of joint Norwegian-British-American expeditions in Norway. The investigations into the problems of solifluction were assisted by grants from the R.G.S. and the Nansen Fund (Norway).

10. *Cambridge South-East Iceland Expedition* 1957.—The main object of this

expedition, led by R. E. Lawrence, Trinity College, was the study of the formation of the ogives on Svinafellsjokull, and the work undertaken during the seven-and-a-half weeks at Glacier Camp is briefly summarized in their report.

11. *British Borkou-Ennedi Expedition in the Libyan Desert.*—A programme of work on survey, hydrography, geology and palaeontology, zoology and botany, archaeology and anthropology, was carried out under the leadership of Captain B. D. McD. Booth.

Reports have also been received from expeditions to which instruments were lent, and these may be summarized as follows:

1. *Cambridge Andean Expedition.*—Leader Simon Clark, Clare College; climbed and surveyed a considerable area of the Cordillera Vilcanamba, and climbed Pumasillo.

2. *Yorkshire Himalayan Expedition.*—Leader W. Cowley. Survey, climbing, photography and sound recording in western Himalaya; impeded by bad weather.

3. *Imperial College Karakoram Expedition.*—Leader Eric Shipton. Climbing and survey, geological and glaciological research in the Siachen area.

4. *Queen's University, Belfast, Expedition to Spitsbergen.*—Leader P. Robson: geological and topographical work in west central Spitsbergen.

5. *Archaeological Reconnaissance in eastern Kalat.*—Leader Miss B. de Cardi: a survey of archaeological sites in Kalat was carried out in collaboration with the Department of Archaeology, Government of Pakistan.

The following expeditions, approved but not aided by grants or loan of instruments, have also submitted reports:

1. *North Sweden Research Group, University College, London.*—Leader M. C. Naish: work was continued from 1956 on topographical work over an area of some 70 square miles in the extreme north of Sweden.

2. *University of Durham Exploration Society Expedition to Andorra.*—Leader C. Emmott: research in geography, geology, botany and zoology was carried out.

3. *Bristol University Greenland Expedition.* Leader J. W. Cowie: geological work in western Inglefield Land.

4. *Oxford University Mountaineering Club Stornstein Expedition.*—Leader C. J. Mortlock. Exploratory mountaineering in the Storsteinsfjell, Ippocokka and Cainevarre massifs, and glaciological studies in the Storsteinsfjell massif.

5. *Cambridge French West Africa Expedition.*—Leader J. M. Davis, Gonville and Caius College. Visited the Gabon and studied bird and plant life; also research into the disease of Schistosomiasis.

CENTENARY OF THE BIRTH OF JOSEPH THOMSON

Joseph Thomson, the centenary of whose birth occurred on February 14, was one of the outstanding British explorers of Africa in the nineteenth century. Born at Penpont in Dumfriesshire, he studied geology under Sir Archibald Geikie, and at the age of twenty-one was chosen as geologist to accompany the Society's East African Expedition of 1878–80. At that time there was great public interest in central Africa, stimulated by the activities of King Leopold of the Belgians, who had established the International African Association at Brussels to open up the continent. Great Britain had declined to become a member, but it was felt that in view of its record in African exploration, this country should not entirely abandon the field to others. Accordingly, the Society raised an African Exploration Fund, and organized this expedition, under the leadership of Alexander Keith Johnston, to pioneer a direct route from the east coast to Lake Nyasa, and to examine the country between that lake and Lake Tanganyika. The well-equipped expedition left Dar-es-Salaam in May 1879, but had not progressed far when Keith Johnston died from dysentery. Thomson, despite his lack of experience, assumed command and decided to carry out the expedition as planned, which he did successfully. He was the first to reach Lake Nyasa from the north; then, crossing the plateau to Lake Tanganyika, he journeyed

along its western shores, examined the Lukuga outlet, and, when turned by native opposition, was nearing the Lualaba, the main stream of the Congo. This was all country previously untraversed by Europeans. He also visited Lake Rukwa (Lake Leopold) for the first time before returning to the coast. He marched in all 2800 miles, of which 1300 miles were through unexplored territory, an achievement the more striking since he was unable to determine his position astronomically.

After a short expedition to the upper Rovuma, to examine a reported coal deposit for the Sultan of Zanzibar, Thomson returned to England, and shortly afterwards was appointed by the Society to lead a second expedition to East Africa. Before setting out he received some further instruction in geology and in fixing positions by astronomical observations. This time, his objective was the country of the warlike Masai. The German, G. A. Fischer, the only explorer to precede Thomson in this area, had, late in 1882, reached Lake Naivasha where he was halted by native hostility. Thomson left Mombasa in March 1883 and, having climbed Kilimanjaro to a height of 9000 feet, attempted to pass west of that mountain. Fischer, however, had been involved in fighting in that region, so Thomson—who could boast that he had never killed a native even in self-defence—turned back, and made his way to the east of the mountain. After reaching Lake Naivasha and approaching Mount Kenya from the west, he explored Lake Baringo and ultimately gained the north-eastern shores of Victoria Nyanza in Kavirondo. Before his return journey to the coast, he visited the caves on the slope of Mount Elgon. Through this journey, which ranks high in the annals of African exploration, he was enabled, as a geologist, to make the first scientific report on the great African rift valley, and to contribute much to knowledge of the topography and peoples of East Africa. For this work he received the Founder's Medal. The President, the Marquis of Lorne, in handing the medal to Sir Rutherford Alcock in Thomson's absence, summarized his achievement thus: "The cheerfulness with which he endured hardships, delays, obstacles of every sort, and even insults from his barbarous hosts, the patient skill with which he converted his half-hearted and mutinous followers into a band of devoted and trustworthy friends, his quiet tenacity of purpose, his dexterity in dealing with warlike and aggressive tribes, and the accomplishment of this perilous journey without shedding a drop of human blood—all these qualities and deeds point him out as one in the foremost rank even of those distinguished travellers, of many countries, who have been selected by the Society for their highest honour."

Thomson at the time was travelling in West Africa, where he negotiated treaties with the Emir of Sokoto and other chiefs which contributed to the establishment of British influence in Nigeria. Later he paid a short visit to Morocco, twice crossing the Atlas, but failing to penetrate to the Wadi Draa. On his last journey, made on behalf of Cecil Rhodes, he travelled up the Zambesi and the Shire to the western shores of Lake Nyasa, and thence to Lake Bangweulu. His health suffered seriously on this journey, and he died at the early age of thirty-seven in 1895. He contributed accounts of his explorations to the Society's *Proceedings*, and his two principal achievements are attractively recorded with humour in 'To the Central African Lakes and back,' 1881, and 'Through Masai land,' 1885. His name is commemorated in Thomson's Falls, as he called the falls on a headstream of the Uaso Nyiro which he visited on his way to Mount Kenya. The name is now borne also by a neighbouring township.

G. R. CROWE

SOVIET CENTRAL ASIA MAP

The Central Asian Research Centre has recently published the first sheet of a four-sheet map of Soviet Central Asia and Kazakhstan. This, the south-west sheet, covers Turkmenistan, Uzbekistan and a small portion of Kazakhstan. The map is based on plates 53–4 of the 'Atlas Mira,' enlarged from the scale of 1 : 5M. to 1 : 3·75M., or approximately 60 miles to 1 inch. It is clearly printed in six colours, relief being indicated by contours in brown; the contours are rather heavy and

might be more generalized in the lowland areas. A fine brown stipple indicates sand areas, but this is not stated in the legend. The colours are well chosen, though the blue for the rivers is perhaps on the dark side, and the printing is excellent. The names are not too numerous and, except in one or two areas, crowding has been avoided. It is, however, a little difficult to distinguish the status of cities and towns from the size of the type employed, though the town symbols help in this. All geographical names and terms have been transliterated according to the rules of the Permanent Committee on Geographical Names; the glossary to be issued with the complete map will be of value to the non-specialist user. The legend, no doubt from lack of space, is compressed into a corner and is not entirely complete. The map, which it is intended to revise at intervals, will be useful to students of Central Asia for general reference; it is to be regretted, though no doubt there were formidable technical reasons, that the dimensions of the sheet could not have been greater, but it will be possible eventually to mount the four sheets to form one map. The price of this sheet is 10*s*, obtainable from Messrs. Luzac, 46, Great Russell Street, W.C.2.

G. R. CRONE

ORDNANCE SURVEY

The Annual Report of the Ordnance Survey, 1956–7, records the completion of the Third Geodetic Levelling of England and Wales, with a probable limiting error well within the requirements for levelling of high precision of the International Association of Geodesy. Good progress was made with the revision for the Seventh Series one-inch maps and it was expected that this series would be completed by December 1957. A new revision for those sheets in which most change has taken place was planned to start in January 1958. The provisional edition of the 1 : 25,000 series has been completed, about half the sheets have been revised, and experiments in the design of the regular series continues. Two new tourist maps of the one-inch series are in production, introducing a "new approach to the depiction of relief."

HISTORICAL GEOGRAPHY IN FRANCE

It was during the thirties that the historian Marc Bloch and the geographer Roger Dion published their first general studies of the origin and development of the French rural landscape,[1] offering fresh interpretations of the existing patterns of settlement, field systems and farming practices, putting forward ideas which have inspired and stimulated further discussion of the subject by both historians and geographers. What Marc Bloch called "histoire régressive," and Roger Dion called "géographie retrospective," have much in common.[2] Both writers regarded a knowledge of the past as indispensable to an understanding of the present landscape, and they sought this knowledge by tracing back step by step from the observable features of the present landscape to the remote past, identifying in archives, maps, place names and the archaeological discoveries of past periods the antecedents of present-day villages, fields, woods and wastes. By studying recent landscapes, whose record is usually fuller and more certain than that of earlier times, they were able to distinguish features of recent origin from those of greater antiquity.

The methods used by Bloch and Dion to trace the origins of the French rural landscape have subsequently revealed a number of local variations that cannot be explained in terms of the broad generalizations that were offered in the thirties. The three-fold division of France into regions of "champs ouverts allongés" in the north and east, of "champs enclos" in the west and the Mediterranean, and of "champs ouverts et irréguliers" in the rest of the country, proposed by Marc Bloch; and the two-fold division into regions of "plaine" and "bocage" proposed by Roger Dion, have both had to be considerably revised.

The immense progress that has been made since then in the study of the changing landscape is reflected in the wealth of papers which has appeared in the *Bulletin de l'Association des Géographes Français* and in the *Annales Économies Sociétés Civilisations*. The *Annales*, which, under its original title of *Annales d'Histoire Économique*

et Sociale, was founded by Marc Bloch and Lucien Febvre, has been devoted almost entirely to studies in agrarian history and historical geography. Further studies have appeared in provincial reviews, especially in the *Revue de Géographie de Lyon* which was founded by André Allix in 1925 under the title of *Les Études Rhodaniennes*, in the *Revue Géographique des Pyrénées et du Sud-Ouest* founded in 1930 by Daniel Faucher, and in the post-war *Publications de la Société de Géographie de Lille* to which Roger Dion has made several notable contributions.

But the full measure of the increase in the interest shown by French geographers in historical geography is revealed by a number of recent regional monographs. The current trend was heralded before the war by the appearance in 1932 of Pierre Deffontaines' study of the Middle Garonne and in 1934 of Roger Dion's 'Val de Loire.' It is well demonstrated in the recent works of Maurice Le Lannou, Max Derruau, Étienne Juillard and René Lebeau, to name but four.[3] Each of these works is devoted to the historical study of the human or social geography of a relatively small region, drawing upon a wide range of sources and illumined by an intimate knowledge of the ground itself.

The great volume of literature now available makes the task of generalization seem more rewarding but hardly less difficult than it was in the thirties. But a general view of the work so far accomplished in the study of rural landscapes and agrarian systems has just been written by four leading French historical geographers, Étienne Juillard, himself a pupil of Roger Dion, André Meynier, Xavier de Planhol and Gilles Sautter.[4] The volume was issued as an introduction to the Colloque International de Géographie et d'Histoire Agraire which was held at Nancy this summer.

The changing rural landscape was the theme of thirty-seven papers presented at the Nancy conference. The majority were by French geographers and historians, and most of them dealt with aspects of the rural landscape of France. Regional studies of rural settlements and field systems figured prominently among the French contributions; such were the papers by Charles Christians on the Ardennes, by André Fel on the Massif Central, by Paul Fénelon on Périgord, by Gabriel Fournier on the Auvergne, by François Gay on Berry, by Étienne Juillard on Alsace, by Roger Livet on Provence, by Jean-Paul Moreau on Burgundy, by Henri Smotkine on Languedoc, and by Guy Thuillier on the Limagne. Complementary to the specifically regional studies were accounts by Charles Higounet of farming and settlements associated with the monastic colonization of the thirteenth century, of seigniorial holdings and demesne farming by Pierre de Saint-Jacob, of curved strips in the open fields by F. Imberdis, and by Pierre Brunet of the remarkable transformation that has taken place in northern France since the war as a result of the exchange and consolidation of strip holdings. Several other French studies dealt with the rural landscape of the Mediterranean area. Jean Despois examined the problem of terrace cultivation in the Mediterranean lands, André Blanc reported on the rural communities of Yugoslavia, Xavier de Planhol presented a study of the pastoral communities of Anatolia and Édouard Will dealt with Homeric Greece. Four papers were read by British historians and geographers: by Professor T. Jones Pierce on the agrarian aspects of the tribal system in medieval Wales, by G. R. J. Jones on medieval open fields and associated settlement patterns in north-west Wales, by R. H. Hilton on early enclosures in the west Midlands, and by G. G. Elliott on the changing agricultural landscape in Cumberland since 1600. Four papers were read by German geographers; the remainder came from Italy, Norway, Poland, Spain, Sweden and Yugoslavia.[5] Two ideas emerged from discussion of the papers: the first was the discovery of a striking similarity of farming practices, field systems and settlement patterns in widely separate parts of Europe; the second was the recognition of a great variety of names applied to comparable practices and institutions in different localities. One result of the conference was the proposal to publish a glossary of local terminology which it is hoped may serve as an aid to the understanding of the nature and extent of these similarities.[6]

Quite apart from the outstanding merit of many individual contributions and the excellent opportunities afforded by seven days of field excursions to meet and converse with foreign colleagues, the great success of the conference was due to the organizers, and to their deliberate and amply justified policy of limiting its scope. The conference also served as a reminder that the debt of gratitude that is owed by the agrarian historians and historical geographers of all nations to the French was never greater than it is today.

H. C. PRINCE

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Derruau, Max, 'La Grande Limagne auvergnate et bourbonnaise.' Clermont-Ferrand, 1949.
Juillard, Étienne, 'La vie rurale dans la plaine de Basse-Alsace.' Strasbourg, 1953.
Lebeau, René, 'La vie rurale dans les montagnes du Jura méridional.' Lyon, 1955.

[4] Juillard, É., Meynier, A., Planhol X. de, and Sautter, G., 'Structures agraires et paysages ruraux: un quart de siècle de recherches françaises.' Nancy, 1957.

[5] It is proposed to publish the papers read at the conference, together with accounts of the three-day field excursion to the Jura and Burgundy led by René Lebeau, of the three-day excursion across Champagne and Brie led by Pierre Brunet, and of the shorter visits led by Étienne Juillard to Alsace and by Xavier de Planhol and J. Schneider to Lorraine.

[6] A list of the notions it is proposed to define in the glossary may be obtained from:
R. H. Hilton, Department of History, University of Birmingham (concerning southern and eastern England).
G. R. J. Jones, Department of Geography, University of Leeds (concerning northern England and Scotland).
Professor T. Jones Pierce, Department of Welsh History, University College of Wales, Aberystwyth (concerning Wales and Ireland).

ASSOCIATION OF AGRICULTURE

A one-day conference on "Geography and Agriculture" was held by the Association of Agriculture at the University of London Institute of Education on 26 October 1957, and was attended by nearly a hundred educationalists, teachers and students. Sir Patrick Laird, chairman of the executive committee of the Association of Agriculture, introduced the first session when Professor A. N. Duckham, professor of agriculture in the University of Reading, took as his subject "Patterns of farming—a study in bio-geography." Professor Duckham showed that whatever the area under consideration, be it a district, a farm, or Great Britain as a whole, the forces of nature had to be harnessed and that variable and constant factors relating to climate and soil had to be taken into consideration. To illustrate his talk, Professor Duckham used the Sheffield area as an example of a region where the patterns were so diverse that these could be related to the British Isles as a whole.

Dr. Michael Wise, reader in geography at the London School of Economics, took the chair for Miss Joan Bostock, who is editor of the Association of Agriculture's 'Farm study scheme.' Miss Bostock took the conference further afield, finding her "patterns of farming" in the New World. Her illustrations of these patterns were based on the four Canadian farms featured in the Association's series 'Farming in the Commonwealth.' Miss Bostock actually went to Canada to collect her material for these studies, visiting the Provinces of Nova Scotia, Quebec, Ontario and Manitoba.

The conference's third session was presided over by Professor R. O. Buchanan, professor of geography in the London School of Economics, who is also chairman

of the Association of Agriculture's education committee. He introduced Mr. J. S. Duncan of Manchester University. Mr. Duncan took as his theme "The Australian dilemma" and, although he is a New Zealander by birth, he was able, as a geographer from a neighbouring country, to put his finger on many important problems now facing Australia. The prime dilemma would seem to be that of a country with a declining rural population and an expanding urban one, financing its economy largely from its agricultural exports, 50 per cent. of which consist of wool.

P. J. T. BARBARY

HUMAN GEOGRAPHY OF THE PACIFIC REGION

For his presidential address to Section P., Geography, of the Australian and New Zealand Association for the Advancement of Science, Hobart, 1957, Dr. A. Grenfell Price took as his subject "Moving frontiers and changing landscapes in the Pacific and its continents." In a relatively short paper he summarizes very clearly his researches into the effects of European expansion on the natural environments and peoples of the Pacific lands—interpreted widely to include, for example, English-speaking America and Russian Siberia—and the reciprocal effects of these on the Western invaders. His main topics are the human invasions and their influence on population growth: the moving frontier of disease; invasions by plants and animals, and cultural changes effected by Christianity and technological science in general. He concludes that the period of numerical decline from disease of the indigenous peoples has ended, though some are undergoing assimilation. He warns against the view that Asians despise modern science and will not make rapid technological progress. "Although population increase will present, for a time at least, the gravest possible menace, we can hope that the huge problems of internal development will keep Asian eyes and hands off the territories of friendly neighbours." A reprint of this thoughtful paper is in the Library.

MAP OF MOUNT KENYA

The Directorate of Overseas Surveys has recently published a single-sheet map of Mount Kenya on the scale of 1/25,000. Special attention has been given to the representation of relief, and the general effect is very good. Contours are in brown at 50-foot vertical interval, and the relief has been accentuated by hill-shading. The grey plate was produced by photographing a wax model of the map illuminated from a point slightly north of west. The steeper slopes are further emphasized by a violet tint, and the central peaks by additional limited shading in greyish-green. The use of these three plates might be considered extravagant, but it has certainly put life into the map. There are a few points which might be criticized: the use of black for the cliff-symbol, which would have been as effective on the brown plate; the considerable reduction in the size of some of the names on Mount Kenya, and uncertainty in the connection of the glaciers and their names. The practice of placing contour numerals with their heads pointing to the higher ground and in rows at right angles to the contour lines has not proved very successful. A yellow stipple is used to indicate "moorland high altitude grasses"; it appears to cover the whole map except for the areas occupied by bamboo, lakes and glaciers, and to have the effect of reinforcing the accentuation of the relief. The map is based on air photography carried out by the R.A.F., with control by the Survey of Kenya and the Directorate of Overseas Surveys. Additional information was supplied by the Survey and the Mountain Club of Kenya.

G. S. HOLLAND

SOVIET SERIALS IN THE SOCIETY'S LIBRARY

BULLETIN (ISVESTIYA) ACADEMY OF SCIENCES OF THE U.S.S.R. GEOGRAPHICAL SERIES, 1957, No. 3 (May–June). Geography of population at the 18th International Geographical Congress, by V. V. Pokshishevskiy. The work of the commission for the power grid project for the economic regions of the U.S.S.R., by F. N. Sukhopar. The formulation of the precipitation anomaly in the Ukraine, by D. A. Drogaytsev.

The boundaries of the Ural economic region, I. V. Komar. Agricultural development in central Angar as affected by the construction of the Bratsk hydro-electric power station, by N. N. Kozanskiy. Geographical survey of Brazil, Part II, by I. P. Gerasimov. Geomorphology and stratigraphy of the quaternary deposits in the middle Lena and lower Aldan regions, by N. S. Chebotareva and others. Mammal fossils from the quaternary deposits in the lower reaches of the Aldan, by E. A. Vangenheim. Modifications in the bottom and coast relief of the Tsimlyanskoye Reservoir, by S. L. Vendrov. The first Bulgarian globe, by Lyubomir Dinev. Documents relating to the work of G. Y. Sedov during the first winter of the polar expedition of 1912–13, by K. A. Bogdanov. The compilation of conventional signs for special purpose maps, by V. S. Preobrazhenskiy. Detailed soil maps and their importance in physical geography, by V. A. Liverovskiy. Historical and contemporary cartography in China, by Chen Shu-Pen. New edition of the Times World Atlas, by L. M. Byushgens and O. N. Vinogradov.

SAME SERIES, No. 4 (July–August). Morphology of the Earth and its origins, by Y. A. Meshcheryakov. Geographical distribution of arid zones, by E. M. Murzayev. Hydro-meteorological classification of droughts, by S. S. Savina. Natural regions and landscape development in Azerbaydzhan, by V. G. Zabriyev. Principal features of the productive regions in western Siberia, by M. I. Pomus. Structure and geographical distribution of industry in the Polish People's Republic, by A. K. Timashev. Special natural features of fallow and virgin lands in the Kustanay steppes, by A. G. Doskach and Y. I. Fel'dman. Basic laws governing snow-cover distribution in the sub-arctic Urals, by A. O. Kemmerikh. Bottom relief of the southern part of Lake Baykal, by N. P. Ladokhin. Standardized symbols for population on maps, by Rikhard Dolling. Principles governing the agroclimatic regions of the U.S.S.R., by G. T. Selyaninov. The first pan-Chinese conference on quaternary geology, by V. G. Lebedev and Khan Mokan. Geographical science in Sweden, by L. R. Serebryannyy.

BULLETIN (ISVESTIYA) ALL-UNION GEOGRAPHICAL SOCIETY, vol. 89 (1957), No. 3 (May–June). Leningrad and the development of northern sea-routes, by Y. Y. Gakkel'. St. Petersburg–Leningrad and the growth of geographical science in Russia, by R. L. Zolotnitskaya. The Quaternary history of the Okhotsk Sea, by Y. F. Chemekov. Continental climate, by S. P. Khromov. Classification of climates on the basis of productivity, by G. T. Selyaninov. Investigations carried out on the southern edge of the Baltic shield, by G. B. Gorbatskiy. Landscape peculiarities of the Upper Bikin depression, by A. F. Pryaluzhina. New data on the uplift of Fennoscandia, by A. O. Shpaykher. The physical nature of arable slopes and ways of overcoming erosion on them, by D. L. Armand. The Zhiguli Mountains, by V. I. Prokayev. The 18th century manuscript plan of St. Petersburg, by R. L. Zolotnitskaya. N. N. Miklukho-Maklay as oceanographer, by O. I. Mamayev.

SAME SERIES, No. 4 (July–August). Vladimir Afanas'evich Obruchev, scientist and explorer, by V. V. Lamakin. The principal botanical and geographical laws governing the vegetational cover of northern Kazakhstan, by I. V. Borisova and others. Controversial questions of physical geography, by I. M. Zabelin. Observations on the above, by S. V. Kalesnik. Lomonosov's geomorphological system, by A. S. Devdariani. The origin of the Sarpin–Davan depression, by V. A. Nikolayev. New data on the "snow man" (Yeti), by S. V. Obruchev. Holub-Yavan (notes on the "snow man" of the Pamirs), by K. V. Stanyukovich. Karst phenomena in Czechoslovakia, by S. Khabera. Avalanches as a contemporary denudation factor, by Kh. D. Leyev. Economic classification of the internal drainage basins of Africa, by Y. E. Dmitrevskiy. The morphology of Mertviy Kultuk, by N. E. Zeyberlikh. Recent historico-geographical data on the Amur, by A. Meshcherskiy and Z. Tagarov. Post-war cartography in Poland, by L. Ratayskiy.

NOTES

The volume of the BIBLIOGRAPHIE CARTOGRAPHIQUE INTERNATIONALE for 1955 is now published, and copies may be obtained from the Office of the Society for 30s plus postage. Atlases, maps and charts published by twenty-one countries are now classified, and new editions of maps, which were particularly numerous in 1955, are included. The editors, Mlle M. Foncin and Mme P. Somer, hope that in future it will be possible to give more details of the individual map sheets. The appearance of the volume has been considerably improved by changes in the reproduction of the typewritten copy.

* * *

The OXFORD UNIVERSITY EXPEDITION TO SARAWAK 1955–6 has issued a printed report. The expedition went to Sarawak in July 1955 and spent six months in the area of the Usun Apau plateau. About 8000 specimens, archaeological, botanical, geological and zoological, were collected and a study was made of the customs of the nomadic Penans. The leader of the expedition, Guy Arnold, lectured to the Society on 7 January 1957 about the expedition's work, and the present report is a welcome amplification of the article which appeared in the *Journal* for June 1957. It may be consulted in the Library.

* * *

The ROYAL INSTITUTION OF CHARTERED SURVEYORS announce conditions for the annual award of a Gold Medal and prize of 100 guineas. Competitors are invited to submit, before 30 April 1958, a paper on one of the following subjects: Land in relation to national economy; incentives to future property investment, including the place of the leasehold; the future structure of the building industry; the likely effect on land development of scientific progress. Entry forms and rules may be obtained from the Institution at 12, Great George St., London, S.W.1.

* * *

The FIELD STUDIES COUNCIL has issued the programmes for 1958 at its centres at Preston Montford, near Shrewsbury; Malham Tarn, near Settle, Yorks; Flatford Mill, East Bergholt, near Colchester; Juniper Hall, Dorking; Dale Fort, Haverfordwest. Visits to Skokholm Bird Observatory are arranged through the Centre at Dale Fort. A number of "Countryside" courses have been included with a view to encouraging the attendance of Secondary Modern Schools, pupils and staff. General enquiries about the Council and its Field Centres should be sent to The Publicity Secretary, F. S. C., Ravensmead, Keston, Kent.

* * *

The Annual Report (1956–7) of the NATIONAL OCEANOGRAPHIC COUNCIL has just been received in the Library. Published by the Cambridge University Press at 5s, the Report is particularly concerned with work on marine physics and on marine biology, and also touches on the present and future programmes of work for R.R.S. *Discovery II*. She will spend much time in the coming months on work connected with the International Geophysical Year.

* * *

We have received from Messrs. Edward Mortimer Ltd., 12, Thayer Street, London, W.1, a copy of the first edition of their WEATHER RECORD CHART AND CALENDAR, for 1958, price 10s. This provides a sheet for each calendar month with space for recording the weather of every date and also for a weather diary at the back. At the top of each sheet are given normal meteorological values for Kew

Observatory together with a pictorial characterization of the month in question. It is to be hoped that this new venture will receive encouragement as the cumulative value of such weather records and diaries in different parts of the country is likely to be great. It is explained that future observers can arrange to have normal meteorological values supplied for places other than Kew.

* * *

OBITUARY

O. G. S. CRAWFORD, C.B.E.

Dr. O. G. S. Crawford, who died on 28 November 1957 at the age of seventy-one, had been for many years a figure well known in the Society of which he became a Fellow in 1913. In 1940 he was awarded the Victoria Medal.

His interest in field archaeology dated from his school days at Marlborough, but it was not until he found himself a member of Keble College, Oxford, that he came into contact with the then new subject of geography. It was largely due to the influence of H. J. E. Peake that Crawford was persuaded to drop Greats in favour of the Geography Diploma Course and a pass degree. Crawford describes, in his entertaining autobiography, 'Said and done,' how "going from Greats to Geography was like leaving the parlour for the basement; one loses caste but one did see life."

Under the Reader in Geography, A. J. Herbertson, Crawford made rapid progress and soon found himself entirely at home in the new environment of maps and contemporary problems. But it was not long before he began to diverge from the standard geographical path in favour of a study which was to remain the principal preoccupation of his life—the study of prehistory against the background of geographical environment. Nevertheless, he passed the examination for the Geography Diploma with distinction and as a result Herbertson offered him a post as junior demonstrator at the School of Geography.

It was at this time that Crawford began to form the idea of a map of Roman Britain, which came to fruition in 1924 as the first of a series of historical maps published by the Ordnance Survey. This map served later as a springboard for his great international project in cartography, the International Map of the Roman Empire. It was at this time, too, that he launched another important cartographical project which arose, like the Roman Map, from the conviction that geographical environment exercises an influence no less strong in historical than in modern times, and that to detect this influence the mapping of distributions was necessary. The new project was a distributional study of early Bronze Age antiquities in this country and a lecture on it, given at the Royal Geographical Society, was published in the *Geographical Journal*, **40** (1912).

During these years Crawford had become increasingly concerned with archaeological problems, and especially with those of prehistoric archaeology, with the result that, in 1911, Herbertson asked him point blank, was he going to be a geographer or an archaeologist? He decided in favour of archaeology.

The years up to the outbreak of the First World War saw Crawford well set on his new course, which included (with the Routledges) an unhappy and, as far as Crawford was concerned, an abortive expedition to Easter Island. Shortly after this, in 1913–14, he took part in the somewhat eccentric excavations carried out by the late Sir Henry Wellcome at Jebel Moya, near Sennar, in the then Anglo-Egyptian Sudan.

During the First World War, Crawford was first of all attached to the Survey

Division of the Third Army (his geographical training here standing him in good stead) and later was seconded to the Royal Flying Corps. Early in 1918 he was shot down and taken prisoner.

After the war Crawford was appointed by Sir Charles Close, the then Director-General of Ordnance Survey, as the first Archaeology Officer to the Ordnance Survey, and here he devoted himself to producing, among much else, the now famous "period maps" presenting the face of Britain throughout her early history. As an observer in the R.F.C., Crawford had come to realize the value of air photography to British archaeology, and the first fruits of his pioneer studies in this new field revolutionized the subject.

It is not possible to ennumerate here in any detail Crawford's long list of important contributions to archaeology, not only in Great Britain, but abroad. Throughout they were based to a very large extent on field work of his own and, as did all his archaeological work, they showed how the past was always viewed by him with a geographer's eye. Not least of his achievements in later life was his contribution towards the interpretation of archaeology for the benefit of the general public through his foundation and editorship of *Antiquity*, each number of which was prefaced by a characteristic editorial note, blunt, pungent, and coloured by his uncompromising attitude to anything which he regarded as less than good or less than honest. Crawford, an ardent controversialist, was above all characterized by his independence of spirit, by his complete honesty of mind, and by a formidable industry and energy. His death is a sad loss not only to archaeology but also to the much wider world whose interest in the subject he did so much to foster. He was created C.B.E. in 1950, and was an honorary Litt.D. of Cambridge and Southampton Universities.

L. P. KIRWAN

DR. WILHELM FILCHNER

Dr. Wilhelm Filchner, the German scientist and explorer, died in Zürich on 7 May 1957. Born at Munich in 1877, he was the last to survive of the leaders of the great Antarctic expeditions before the First World War. In 1909 Filchner announced his plans for a trans-Antarctic expedition which, at the same time, would seek to solve the problem of whether Antarctica was one or two continents. His plan received support in the Reichstag and from the German press, but he could not raise enough money for a two-ship expedition and so decided to concentrate his efforts on exploring the region south of the Weddell Sea. In the summer of 1910 Filchner went to Spitsbergen in order to test the sledges and equipment for his proposed Antarctic expedition. Landing in Tempelfjorden, he crossed Vestspitsbergen to Mohnbukta in Storfjorden and made a useful large-scale map of the route.

The story of the *Deutschland* expedition of 1910–12 is well known. After making surveys in South Georgia and being beset in the pack ice of the Weddell Sea, Filchner reached Vahsel Bay—much further south than anyone had previously penetrated in this sector of the Antarctic. A hut was erected on what is now called the Filchner Ice Shelf, but the floating site broke away as a tabular berg and the men had to be re-embarked in dramatic circumstances. The plan to establish a land base had to be abandoned; the *Deutschland* was again beset and drifted 700 miles northwards for nine months before eventually escaping from the ice. But Filchner made full use of his opportunities to study the ice drift in the Weddell Sea, and he was able to show that Morrell's "New South Greenland," reported in 1823, did not exist. Although his plan to cross the continent had to be abandoned, and preparations for a second Antarctic expedition were frustrated by the outbreak of war in 1914, he pioneered the way for such a venture, which only now, nearly half a century later, was destined to be achieved by Dr. Fuchs and his party.

Filchner's explorations in Asia were no less important. He went to Samarkand in 1900, riding on horseback across the huge Pamir ridge from the Russian side. This

was a purely sporting venture but it aroused his scientific curiosity and was followed by his first great expedition to Tibet in 1903–5. In 1926–8 and 1934–8 he led two further expeditions to Tibet. The route he chose in 1935 was throughout the greater part of its length the same as that followed by Mr. Peter Fleming and Mlle Ella Maillart earlier in the same year. In 1939–40 he conducted a magnetic survey of Nepal with Professor Erich Przybyllok, who had accompanied him on nearly all his earlier expeditions.

Filchner spent the period of the Second World War in India. He had never concealed his anti-Nazi feelings, but the Nazis could not afford to eliminate one of the few explorers of international repute left to Germany. He spent his retirement in writing an autobiography: 'Ein Forscherleben' (Wiesbaden, 1951). His most recent work, 'Route-mapping and position-locating in unexplored regions,' written in collaboration with E. Przybyllok and T. Hagen, was published only just before his death. Dr. Filchner's section summarizes the methods which he developed over many years in a wide variety of circumstances. He strongly advocated that route-maps based on compass bearings and marching times must be backed by astronomical fixes and provisional triangulations.

BRIAN ROBERTS

SIR THOMAS WHITE

The Hon. Sir Thomas Walter White, K.B.E., D.F.C., V.D., until last year High Commissioner for Australia in London, died suddenly on 13 October 1957, at the age of sixty-nine. He had been a Fellow of the Society since 1943 and was well known to many of the members as he took an active interest in its affairs and was also a member of the Geographical Club. He was the second man in Australia to obtain a pilot's certificate and was a member of the first oversea unit of the Australian Flying Corps in Mesopotamia in 1915. He was awarded the D.F.C. and twice mentioned in despatches. White and his observer Yeats-Brown were captured in November 1915, after cutting the telephone wires running north and south of Baghdad. He refused to give his parole to the Turks and after three years' captivity managed to escape. An account of his incredible adventures during the course of this escape was subsequently published in book form under the title 'Guests of the Unspeakable.'

After the war he went into business, but retained an early ambition to enter politics and was successful in being elected a member of the House of Representatives in 1929. He served as Minister for Trade and Customs from 1933 to 1938 and in 1949 became Minister for Air and Civil Aviation. He was appointed High Commissioner in London in 1951 where he became chairman of the Empire Council, the British Empire Service League and deputy president of the Royal Life Saving Society, to mention only a few of his offices. White, who held the rank of Group Captain in the R.A.A.F., was the founder of the Australian Aero Club, and took a leading part in the development of the flying medical services. In addition he was a keen patron of the arts—he had himself written a small book of poems entitled *Sky saga*—and took an active interest in the promotion of organizations in Britain for Australian artists, musicians and writers. He married Vera, the daughter of the Hon. Alfred Deakin, a former Prime Minister of Australia, and they will long be remembered with affection by their many friends in London, and for the part they played in strengthening the ties between this country and Australia.

E. HINDLE

MISS MARIA CUST

The death of Maria Eleanor Vere Cust, at the age of ninety-five, was announced in *The Times* of 6 January 1958. She was the daughter of Robert Needham Cust, who was one of the Society's most active Fellows towards the end of last century. Mr. R. N. Cust was one of the organizers of the International Geographical Congress held in London in 1895, and he was also a zealous advocate of the election of women to the

Society's Fellowship. When the Council, under the presidency of Sir Mountstuart Grant Duff, approved this startling innovation in 1892, Miss Maria Cust was one of the fifteen "well-qualified ladies" (to quote H. R. Mill) who were chosen for admission. The ladies were admitted in alphabetical order and the fact that Mrs. Isabella Bird Bishop was exploring Tibet at the time meant that Miss Cust was, in fact, the first woman to be admitted a Fellow of the Society. This election was the last time that use was made of the old formula (still employed by some of the learned societies): "In the name and by the authority of the Royal Geographical Society, I hereby declare you a Fellow thereof." The solemnity of this occasion was rather marred by the quarrels which broke out subsequently about the legality, and indeed desirability, of admitting women to the Society, and it was not until 1913 that the controversy came to an end and women were accepted on the same footing as men. Miss Cust acted for many years as secretary to her father, a distinguished Orientalist, and she also worked as a missionary in India. Knowledgeable and well-travelled, she retained to the end of her life a number of friends of all ages, who regarded her as a pioneer of women's activity in a sphere wider than the domestic one.

MRS. WILL GORDON

Mrs. Will Gordon, who died last December in Lausanne at the age of ninety-one, was one of the Society's benefactresses and had been a Fellow for over forty years. She had many interests, principal among them being her championship of Anglo-French friendship and of the Allied cause in two world wars. A vigorous traveller, she also wrote and lectured on causes near her heart, and yet found time to indulge in a wide philanthropy. In addition to other benefactions, Mrs. Gordon, after discussions with the then President of the Society, Lord Rennell, decided to give a sum of money to the Society for the "Mrs. Will Gordon Award," of which the first payment was made in 1948. The award, administered by the Society, was to take the form of a biennial prize for the best article, or book, or lecture, by an Englishman, Frenchman, or American on some aspects of contemporary East Africa, with geographical implications. The first lecture was given by Professor E. B. Worthington in the Society's Hall in the May of 1950 (*Geogr. J.* **116** (1950), pp. 29–48). Professor W. A. Kennedy and Sir Mortimer Wheeler lectured in 1953 and 1955, and Dr. Audrey Richards will give the Mrs. Will Gordon lecture for the session 1957/8, the paper to be printed in the current volume of the *Journal*.

GEORGE DUNCAN GARDNER, T.D.

G. D. Gardner, first assistant in the Map Room, died in hospital after an operation on January 11 at the age of sixty-two. He joined the Society's staff in 1920 as personal assistant to the Secretary, Mr. A. R. Hinks. For many years he also served as clerk to the Mount Everest Committee, and in these capacities he was known to a great many Fellows and visitors to Lowther Lodge. For the last few years he was also clerk to the Geographical Club. Gardner, who went to France as a territorial in December 1914, was subsequently commissioned in the Royal Artillery and served in Egypt. He also served at home in the 1939–45 war, mainly with prisoner-of-war camps. He was a keen member of his local branch of the British Legion, a special constable for a number of years, and an enthusiastic horticulturist, specializing at one time in growing sweet peas. George ("Peter") Gardner was essentially a very kindly, sociable man and his warm welcome to all Fellows visiting the Society, and especially to those living overseas or far from London, will be remembered with pleasure by many. By them, by present and past members of the Council and by the Geographical Club, and most of all by his colleagues, whose deep sympathies go to his widow and daughter, he will be much missed.

G. R. CRONE

LORD DUNSANY

Lord Dunsany, who died in Dublin in October 1957, was proposed for Fellowship of the Society by Sir Francis Younghusband in 1927. Known primarily as a distinguished writer and a lecturer, Lord Dunsany was a soldier by profession, an enthusiastic fox-hunter and big game shot, and had travelled widely, especially in North and East Africa.

SIR RANDLE HOLME

It was as a past President of the Law Society that *The Times* obituary chiefly remembers Sir Randle Holme, who died in London on 23 December 1957, aged ninety-three. But he was also an enterprising explorer; he penetrated into the interior of Brazil in 1885, and in 1887 made a journey through Labrador on which he read a paper to the Society in the following year. His Fellowship of the R.G.S. dates from November 1888 and his proposal form is signed by, among others, Sir John Kirk.

SIR SYDNEY KING-FARLOW

Sir Sydney King-Farlow, who died on 26 November 1957 at the age of ninety-two, was elected a Fellow of the Society in 1889, the year in which he was called to the Bar by the Middle Temple. He was a keen traveller, and his profession took him far afield; in 1912 he was appointed a Puisne Judge of the High Court of Uganda and in 1920 he became senior judge of the Supreme Court of the Gold Coast. He was appointed Chief Justice of the Bahamas in 1922, of Cyprus in 1924, and of Gibraltar in 1927. He retired in 1931 and settled in Jersey.

CORRESPONDENCE

AN ARTIST AMONG MOUNTAINS

Under the heading "Reviews" in Vol. CXXIII, Part 4, of the *Geographical Journal* of December 1957, you published a series of misleading and disparaging remarks about my book, 'An Artist among Mountains,' calculated to discourage anyone from reading it. At your invitation, I take this opportunity to indicate some of the points in which your reviewer, unique among many, is unjust.

It is a monstrous misrepresentation to say that the book is "little more than a catalogue of places visited and painted" and to imply that the style is poor and the information superficial. Owing to lack of space I cannot quote other reviewers at length: suffice it to say that several exciting passages of the narrative have been broadcast by the B.B.C.; that *The Alpine Journal* said I had "a vivid flair for description"; and that the *Times Literary Supplement* said "Some of his descriptions are very fine . . . his book is full of interesting material"; and that the *Surrey Advertiser* said I had "a simple ease of style. . . . It is one of the best travel books we have read." I could quote many others equally favourable.

Your reviewer disparages what he calls my "water-colour illustrations," asserts that I wrote with a "desire to omit nothing" and attributes to me a "contempt for photography as a means of mountain portrayal." This is all nonsense. The illustrations are not water-colours. Hundreds of my mountain drawings have been published and exhibited; some have been praised by mountaineers such as Sir John Hunt

and Mr. Eric Shipton; the well-known artist, Mr. Claude Muncaster, said the illustrations were "excellent" and *The Alpine Journal* said that "many of them are little masterpieces." As a professional writer, I know better than to "omit nothing." I deliberately omitted a great deal, some of which has filled another book. Nothing in the book suggests that I have a "contempt for photography"; in fact, I said that "a skilled photographer can make a beautiful picture of mountains" and I am myself a photographer. But, like most people, I dislike bad photographs and I know from experience that an artist can do certain things that the camera cannot do.

I refrain from saying more, except that I have not heard of a single reader—apart from your reviewer—who did not enjoy reading my book. A number of unknown readers in different parts of the world have written to thank me for writing it. I challenge your reviewer to indicate one of the thirty-three illustrations that contains "rocks that are wooden stage-props and snow that is clearly paint."

V. COVERLEY-PRICE

Brackenhurst,
Ewhurst, near Cranleigh,
Surrey,
30 *January* 1958

Dr. Cunningham writes:—

I am sincerely glad that other reviewers and readers think more highly of Mr. Coverley-Price's book than I do! I have reread the book and see nothing unjust or misleading in my review. "And when it's writ, for my sake read it over. And if it pleases you, so; if not, why, so." I have already specified where the unsympathetic remarks on photography are to be found. They are still there. *Journal* readers presumably expect books to be reviewed for them by firmer criteria than those normally pertaining in, say, the local press and for this reason it seems fair to describe Mr. Coverley-Price's text as superficial. I find unhappy representations of rock forms on pictures opposite pages 49, 112, 193.

A. B. CUNNINGHAM

Royal Holloway College,
Englefield Green,
Surrey,
8 *February* 1958

MEETINGS: SESSION 1957–8

Meeting of 15 July 1957. The President in the Chair

Elections to Fellowship: Miss R. P. E. Andrews; Eric L. Bailey; John Baker; John G. Bonner; Sydney D. Bowers; M. A. Boyd; Robin Boyd; Robert J. Chambers; Mrs. Flora H. K. Cheong; William G. Colohan, B.SC.; Samuel A. Darko; Alan R. J. Dickie; Geoffrey V. G. Fowler; Sudershan K. Gajree; Leslie T. Good, M.A.; Peter W. Green, B.A.; Michael Harding; John H. Harris; George E. Harrison; Joo Seang Heah; Harold L. Hills; John H. Hills; John L. Hird; William D. Holmes; John H. Hopker; Jack F. W. Howes, M.A.; Rev. George T. Johnson; Dr. Arthur C. E. Koch; Jonathan K. Lamptey; Rev. Sidney Lawrence; Miss Jean C. Ledger; Melvin P. McGovern; Rev. Roy H. McKenzie; Nigel O. McLaughlan; A. M. A. Majendie; Andrew Malcolm; Miss Alice E. Martin; John M. Mildren; George H. S. Mills; David R. E. Philpott; Miss M. M. Martin-Richards; Michael J. Selby; Mohan Lal Sharma; Denzil T. Smith; Graham Thomas; Baron W. F. von Blomberg; J. C. Waller; Antony L. Ward; Major J. A. H. West; Flight Lieutenant Ronald Wilkinson; Alan R. Wilson, B.A.; Leslie J. Wiltshire; John S. Woodward

Elections to Associate Membership: Michael A. A. Clark; Miss L. M. Haynes; Miss A. C. MacRobert; H. Adrian J. Smith

Elections to Corporate Membership: The Automobile Association; Thomas Cook and Son Ltd.; de Havilland Holdings Ltd.; The English Electric Co. Ltd.; Esso Petroleum Co. Ltd.; Great Universal Stores Ltd.; Singer and Friedlander Ltd.; Unilever Limited; S. G. Warburg and Co. Ltd.

Meeting of 14 October 1957. Mr. Leonard Brooks in the Chair

Films: Expeditions to Persia and Peru. Commentaries by K. A. McDougall and J. C. Jewell

Meeting of 21 October 1957. The President in the Chair

Paper: Mapping Antarctica from the air. By P. G. Mott

Meeting of 28 October 1958. Professor W. G. East in the Chair

Paper: Historical geography of English paper mills, 1495–1800. By A. J. Shorter

Meeting of 4 November 1957. The President in the Chair

Film: My life in Thailand. Commentary by H.R.H. Prince Chula of Thailand

Meeting of 11 November 1957. The President in the Chair

Elections to Fellowship: Dr. Charles Anderson; Sydney D. Bailey; George C. Band; A. D. Baptist, B.A.; David H. Bevan, B.A.; Rev. Bob Boyd; Mrs. C. D. Bruen; Commander J. R. Bubb; Brian T. Bunting; Ronald J. Burgess; J. H. Archer-Burton, O.B.E.; M. H. Bushby; Miss Anne Cavendish; Michael J. Challons; P. A. Pudsey-Dawson; J. A. Dennis, B.SC.; Andrew E. de Salis, M.A.; J. M. H. Millington-Drake; Rev. H. S. Enderby; Miss Jill Evans; Miss A. M. Ferrar; Rev. F. H. Ferris; H. P. C. J. Fleet; N. C. Flemming; Derek R. Fletcher; Ralph P. Forster; Mrs. R. M. Gerson; Colin E. Green; Paul A. Groves, B.SC.; Paul Hahn; George F. Hamm; The Rt. Hon. Antony Head; Miss T. S. Hichens; Anthony J. Huxley; Hugh N. Jeffery; B. L. C. Johnson; Rev. E. E. Lewis; Dr. Herbert Lockyer; Rev. R. P. Lonsdale; Lieutenant C. D. Mackenzie; Miss Mary M. MacNeill; Rev. Walter J. Main; John W. Marshall; Mrs. Mary C. Millar; Miss Eva Milrath; D. E. Morris, B.SC.; J. Ngai; A. F. Olatunji; R. Fenwick-Owen; Rev. George A. Palmer, D.D.; C. J. Patel; Miss E. H. Pemberton; T. M. Perry, B.A.; Tim Puribhat; Midshipman J. D. Quinland; Mrs. Ellison Rich; Lieutenant-Colonel Peter Rodyenko; Miss J. M. Roger, B.A.; S. G. Sathaye, B.A.; L. H. Saunders; D. J. H. Searle; A. H.

Siddiqui, M.A.; G. Smaylen, B.SC.; J. R. Smith; G. B. Spenceley; Miss J. Stanley; Charles R. Stoddart; Rev. L. Strauss, B.A.; T. R. Sutherland; Miss Agnes Taylor; Rev. Horace M. Taylor, B.A.; William L. N. Tickell, B.SC.; Henry Tootell; John Tunstall; L. J. Clovis Vellin; Bruce Watson; John E. Wade; G. D. Watters; P. E. J. F. Wells; John Whiteley, B.A.; David H. Williams; G. J. Williams, B.A.; David Wise; John D. Wooding, B.SC.

Elections to Associate Membership: K. B. Atkinson; Richard E. Bill; William J. Brown; Derek J. Cable; Robin J. Dannhorn; K. J. Gregory; E. C. Johnson; John P. Langley; F. L. B. Luckcock; Miss J. Maclaran; Peter S. Manley; Michael Pettersson; Miss R. A. Phillips; M. J. West

Paper: Megaliths of France. By Glyn Daniel

Meeting of 25 November 1957. Lord Rennell in the Chair

Paper: Heinrich Barth and the western Sudan. By R. Mansell Prothero

Meeting of 2 December 1957. The President in the Chair

Elections to Fellowship: Isaac A. Adelowo, B.A.; Keith R. Allen; John Baxter, T.D., A.I.A.S.; Derek Burch; Michael L. Burgess, B.A.; Kenneth H. J. Caswell; Prince Chula Chakrabongse of Thailand; James H. Dadswell; Rev. P. John Daniel; Thomas Dewhurst; Charles H. Ellis; R. V. R. Felgate; Francis G. Felix; Ian F. Ferguson; John Alexander Geer; Robert P. Hallworth; Brian Harris; Rev. Paul C. Hartford; Bertram C. Headland; Miss Mary Henderson; Cedric Hentschel, M.A.; Rev. Ashton H. Holden; Norman T. Hull, F.R.S.A.; J. R. Hulme; Harry H. Jackman; Miss Edith King; William R. Langner; Keith J. Miller; David Mossenson, M.A.; Gordon S. H. Pemberton; Dr. M. Petrovitch; Brian G. Plummer; Brian A. Prior; Francis N. Radford; Colin Read; Alan H. Reed; David John Rees, B.SC.; Denys G. Rees; William H. Reynolds; Miss A. E. A. P. Sandford; C. Saunders; Rev. Arnold Seidler; R. H. T. Smith; Sydney W. Smith; Francis T. Sobey; Miss M. M. Stafford, B.A.; Peter A. E. Stewart; M. P. Tankore, M.A.; David Thomas, M.A.; George D. Tooby; Paul J. Tuz, B.SC.; Ernest G. Vann; Peter J. R. Watson; Stanley M. Wide; Peter J. Williams; Norman T. Wills; Patricia J. Woods

Elections to Associate Membership: Ian A. Campbell; J. A. A. Crisp; Miss Ann Davey; Miss E. A. Dowding; Miss L. D. Enevoldsen; Allan E. Harbert; Miss M. P. G. Herbert; Miss R. A. Hirst; Eric W. Holland; Laurence J. Howes; Christopher A. Ingram; Alan A. Mayhew; John Murdin; Miss R. E. Payne; Miss J. Scrivener; Richard W. Stubbing; C. D. Tossell; Miss B. J. Turner; James H. Wade; Miss J. M. Whitaker

Paper: International Geophysical Year. By Dr. D. C. Martin

Meeting of 9 December 1957. The President in the Chair

Film: At the South Pole. Commentary by Captain Richard B. Black, U.S.N.R.

Meeting of 16 December 1957. Mr. Leonard Brooks in the Chair

Films: French films of exploration

Meeting of 31 December 1957. Joint meeting with Geographical Association and Institute of British Geographers

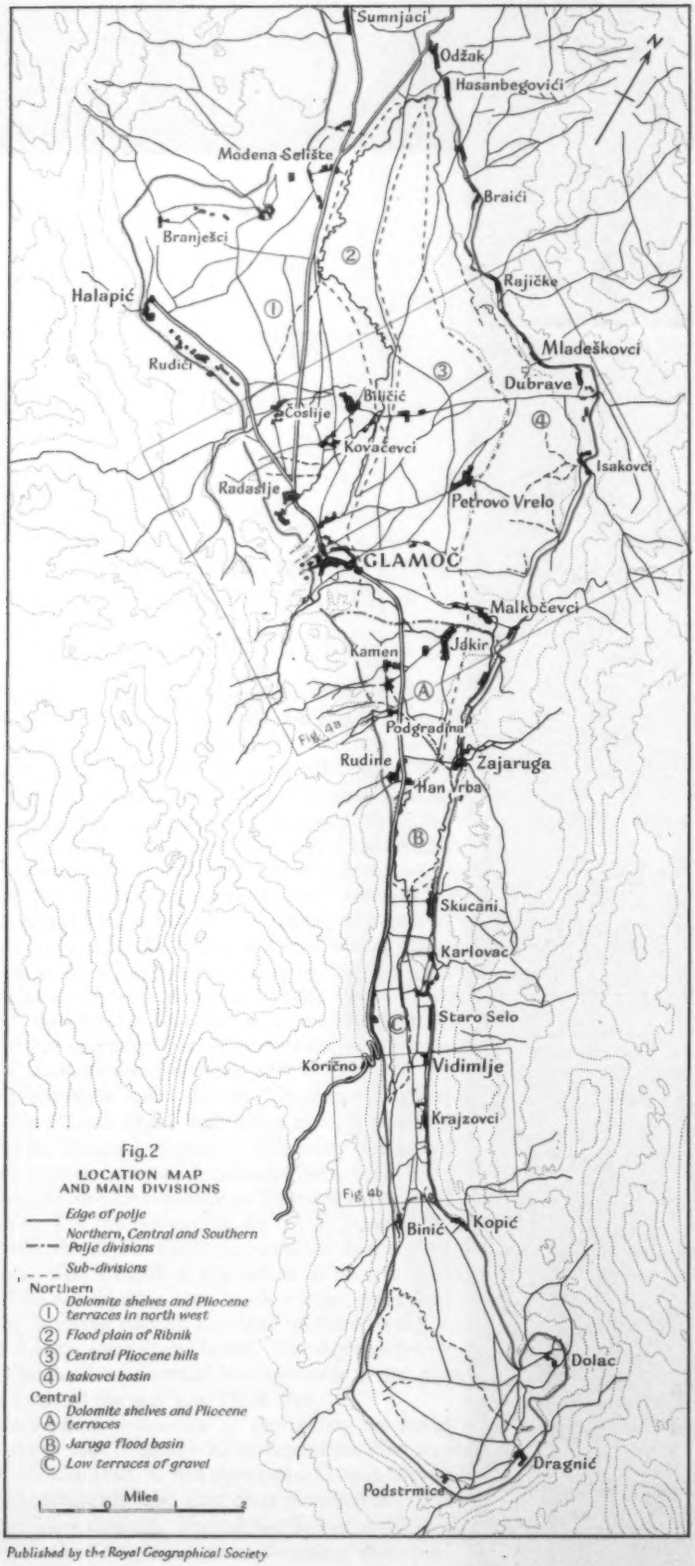
Paper: Urban studies. By Professor A. E. Smailes

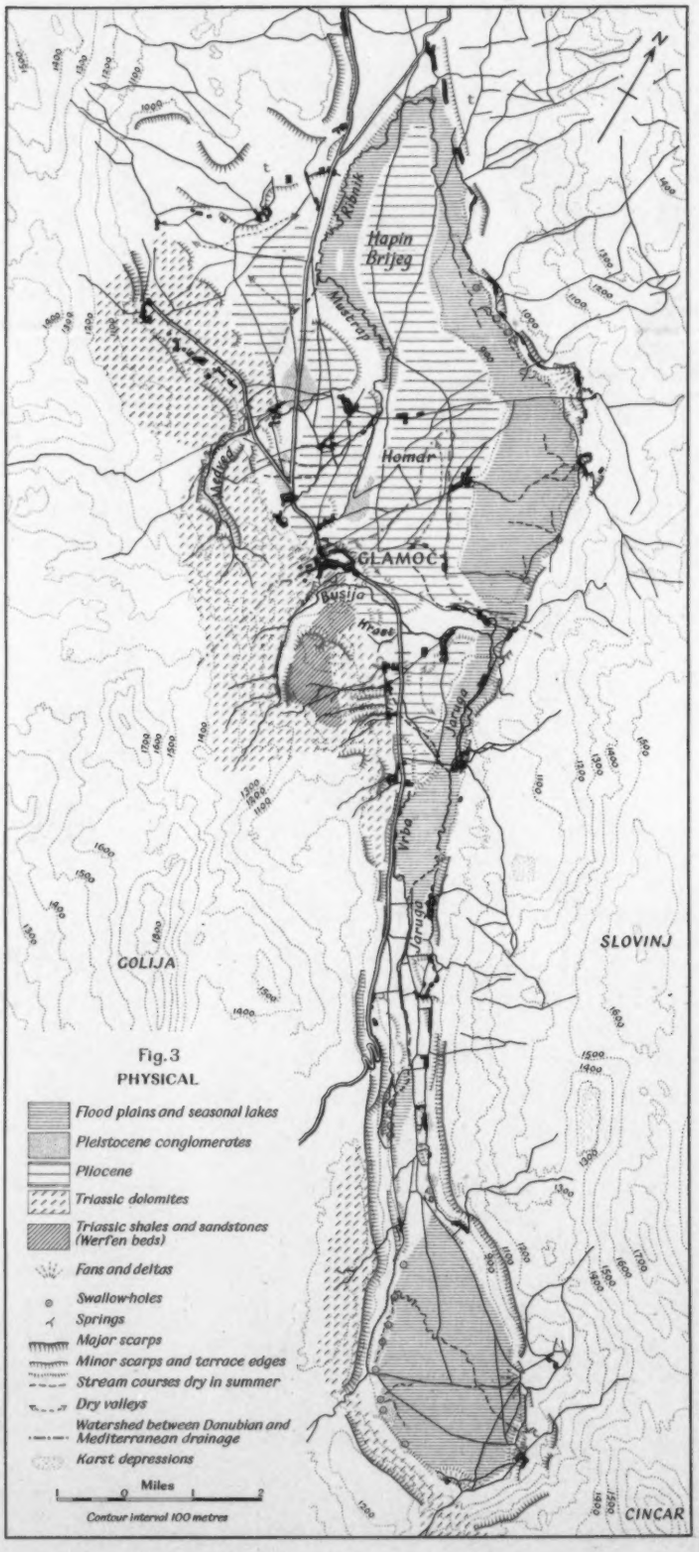
Meeting of 13 January 1958. The President in the Chair

Paper: The South Georgia survey. By Duncan Carse

Meeting of 20 January 1958. Professor E. W. Gilbert in the Chair

Paper: The economic geography of the Isle of Man. By J. W. Birch





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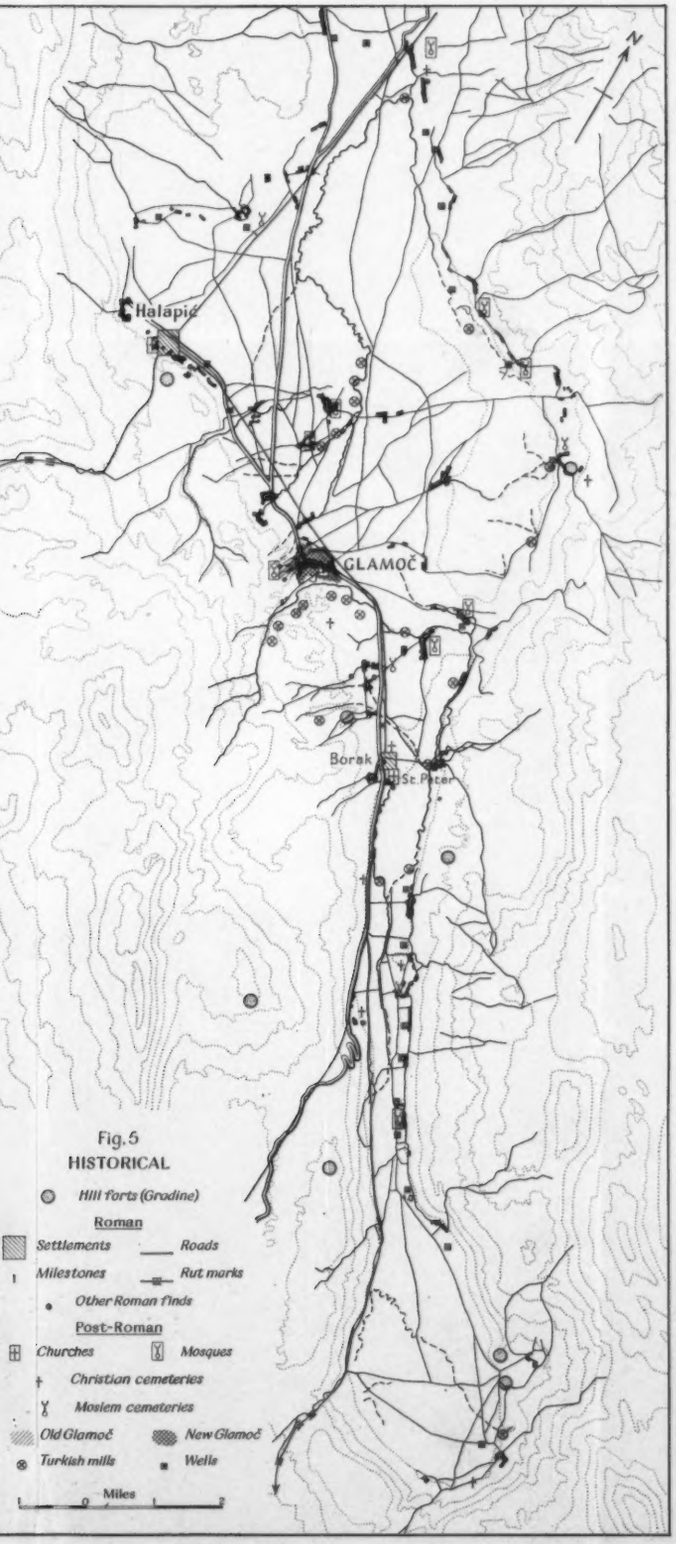
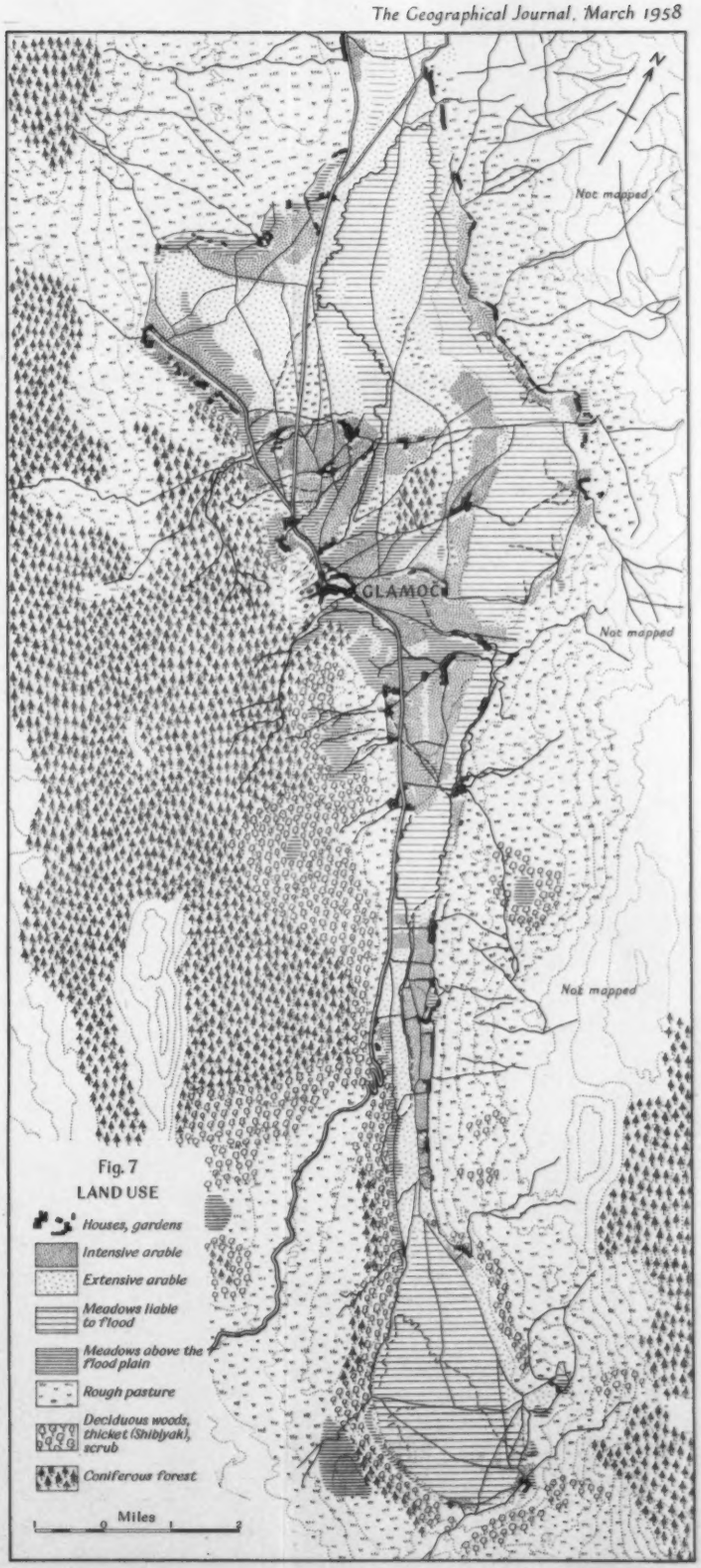




GLAMOČKO POLJE

H.J. SAVORY

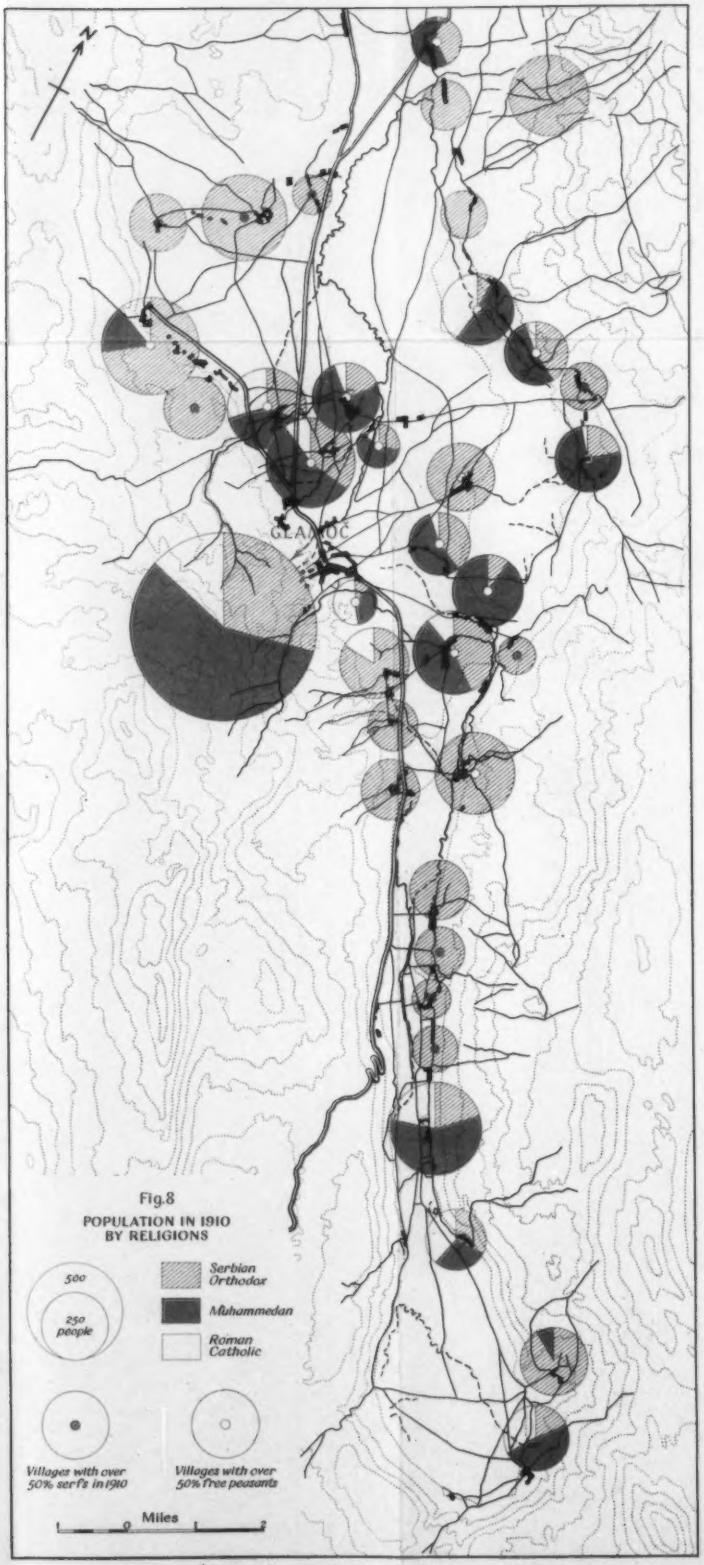


Fig.8
POPULATION IN 1910
BY RELIGIONS

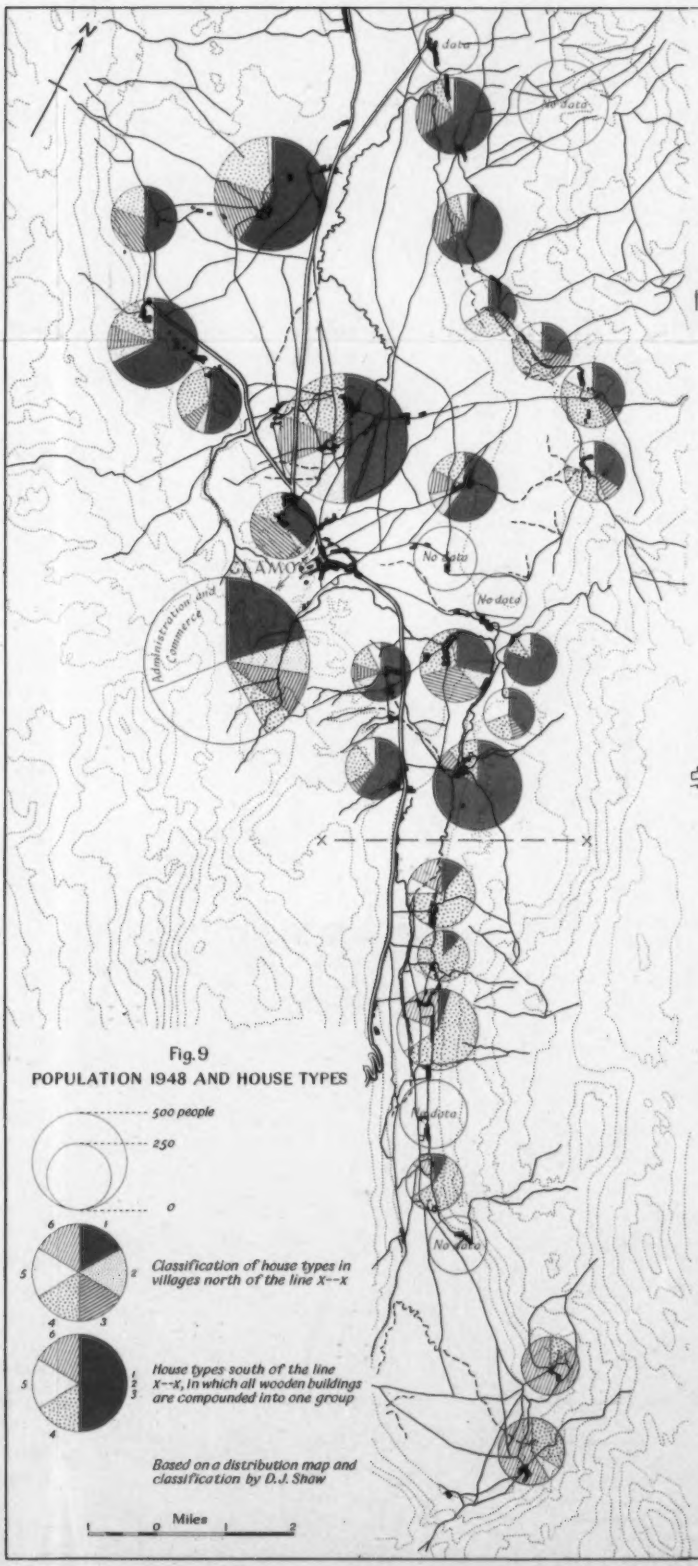


Fig.9
POPULATION 1948 AND HOUSE TYPES

500 people
250
0

Classification of house types in villages north of the line X--X

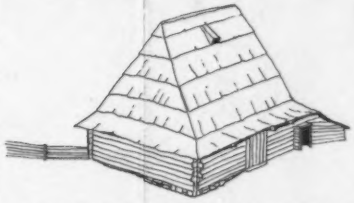
House types south of the line X--X, in which all wooden buildings are compounded into one group

Based on a distribution map and classification by D.J. Shaw

Miles
1 0 1 2

HOUSE TYPES

1 Bosnian type (Brvnara). All wooden, shingle roof, central hearth but no chimney.



2 Modified Bosnian type. All wooden but double-pitched roof.

3 All wooden house with Alpine influence shown in veranda and form of roof.

4 Ground floor stone, first floor wood. Roof usually shingle. This illustration shows a larger house.

5 Modern type. Stone or concrete walls and tiled roof. Mostly built since 1945.

6 Dalmation type. Stone walls and flagstone roof.